ORDER NO. HAD8705138C8

# Service Manual

Cassette Deck

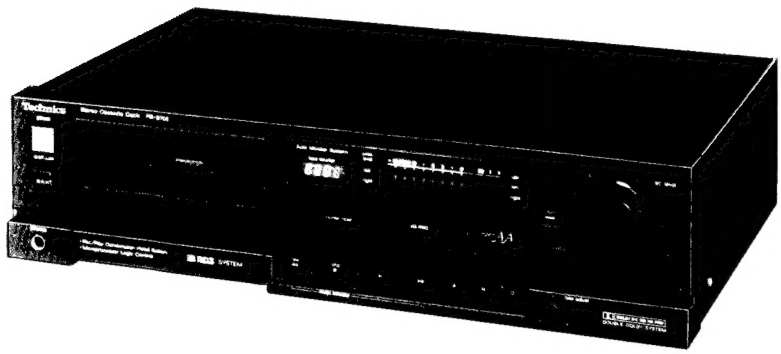
## RS-B705

Closed Loop Dual Capstan
DOUBLE DOLBY SYSTEM

DOLBY B·C NR HX PRO*

**Color**

(K)...Black Type
(S)...Silver Type



| Color | Areas |
|---|---|
| (K) (S) | [E].....All European areas except United Kindom. |
| (K) (S) | [EK].....United Kingdom. |
| (K) (S) | [EG].....F.R. Germany. |
| (K) (S) | [EH].....Holland. |
| (K) (S) | [XA].....Asia, Latin America, Middle Near East, Africa and Oceania. |
| (K) (S) | [XL].....Australia. |
| (K) (S) | [XB].....Saudi Arabia. |

## SPECIFICATIONS

| | |
|---|---|
| **Deck system** | Stereo cassette deck |
| **Track system** | 4-track, 2-channel |
| **Heads** | |
| **REC/PLAY** | Combination head |
| **Erasing** | Double-gap ferrite head |
| **Motors** | |
| **Capstan** | Electronically controlled DC motor |
| **Reel table drive** | Electronically controlled DC motor |
| **Recording system** | AC bias |
| **Bias frequency** | 85 kHz |
| **Erasing system** | AC erase |
| **Tape speed** | 4.8 cm/sec. (1-7/8 ips) |
| **Frequency response** | |
| **METAL** | 20 Hz~21 kHz (±15 dB)<br>30 Hz~20 kHz (DIN) |
| **$CrO_2$** | 20 Hz~20 kHz (±15 dB)<br>30 Hz~19 kHz (DIN) |
| **NORMAL** | 20 Hz~19 kHz (±15 dB)<br>30 Hz~18 kHz (DIN) |
| **S/N** | (signal level = max recording level, $CrO_2$ type tape) |
| **Dolby C NR on** | 75 dB (CCIR) |
| **Dolby B NR on** | 67 dB (CCIR) |
| **NR off** | 57 dB (A weighted) |
| **Wow and flutter** | 0.05% (WRMS)<br>±0.18% (DIN) |
| **Fast Forward and Rewind Time** | Approx. 95 seconds with C-60 cassette tape |
| **Input sensitivity and impedance** | |
| **LINE** | 60 mV/47 kΩ |
| **Output voltage and impedance** | |
| **LINE** | 400 mV/2.2 kΩ |
| **HEADPHONES** | 80 mV/8 Ω |

### ■ GENERAL

| | |
|---|---|
| **Power consumption** | 23W |
| **Power supply** | |
| **For United Kingdom and Australia** | AC 50 Hz/60 Hz, 240V |
| **For continental Europe** | AC 50 Hz/60 Hz, 220V |
| **For others** | AC 50 Hz/60 Hz, 110V/127V/220V/240V |
| **Dimensions (W×H×D)** | 430 × 285 × 109.5 mm<br>(16-15/16" × 4-5/16" × 11-7/32") |
| **Weight** | 4.4kg (9.7 lb.) |

**Note:**
Specifications are subject to change without notice.
Weight and dimensions are approximate.

* HX Pro headroom extension originated by Bang Olufsen and manufactured under license from Dolby Laboratories Licensing Corporation.
"DOLBY", the double-D symbol, and "HX PRO" are trademarks of Dolby Laboratories Licensing Corporation.

Technics

**Matsushita Electric Trading Co., Ltd.**
P.O. Box 288, Central Osaka Japan

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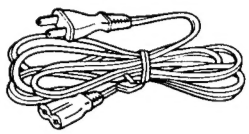
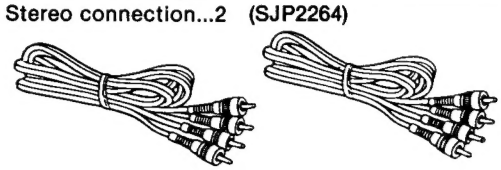
# ■ ACCESSORIES

• AC power supply cord...1
(SFDAC05E03—[E, EG, EH]
SFDAC05G02—[EK]
SJA168-1—[XA]
SJA183—[XB]
SJA173—[XL])



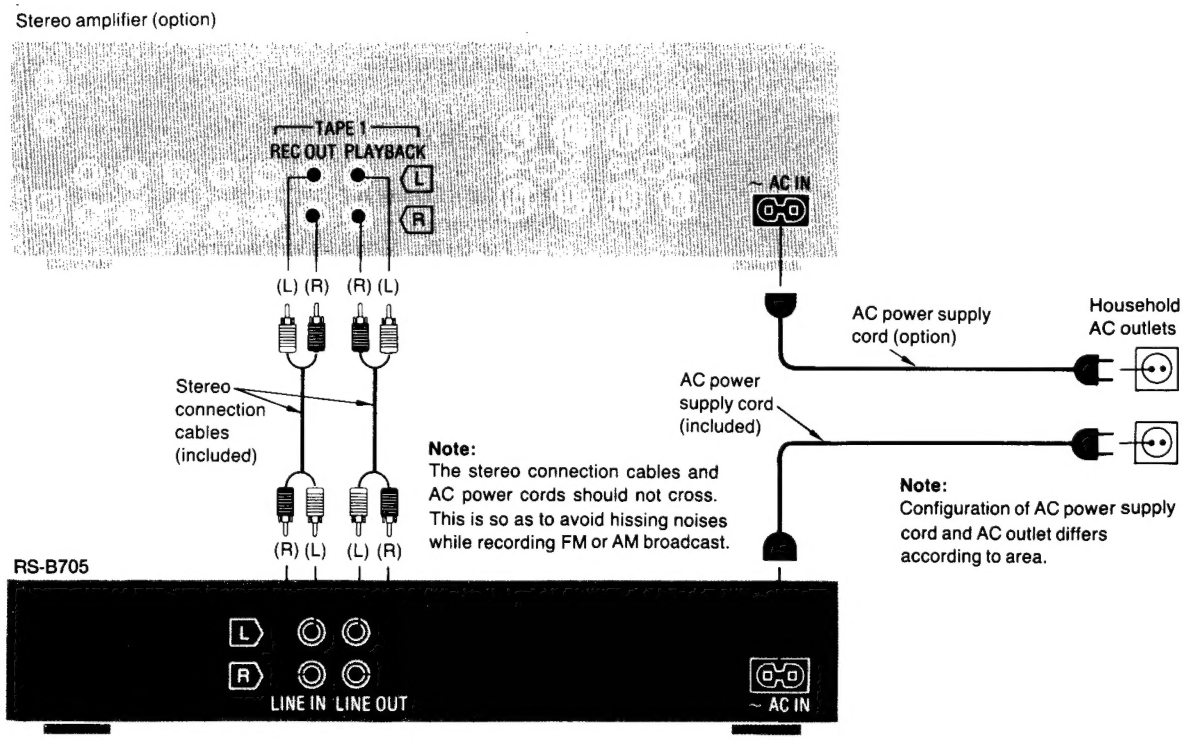
• Stereo connection...2 (SJP2264)



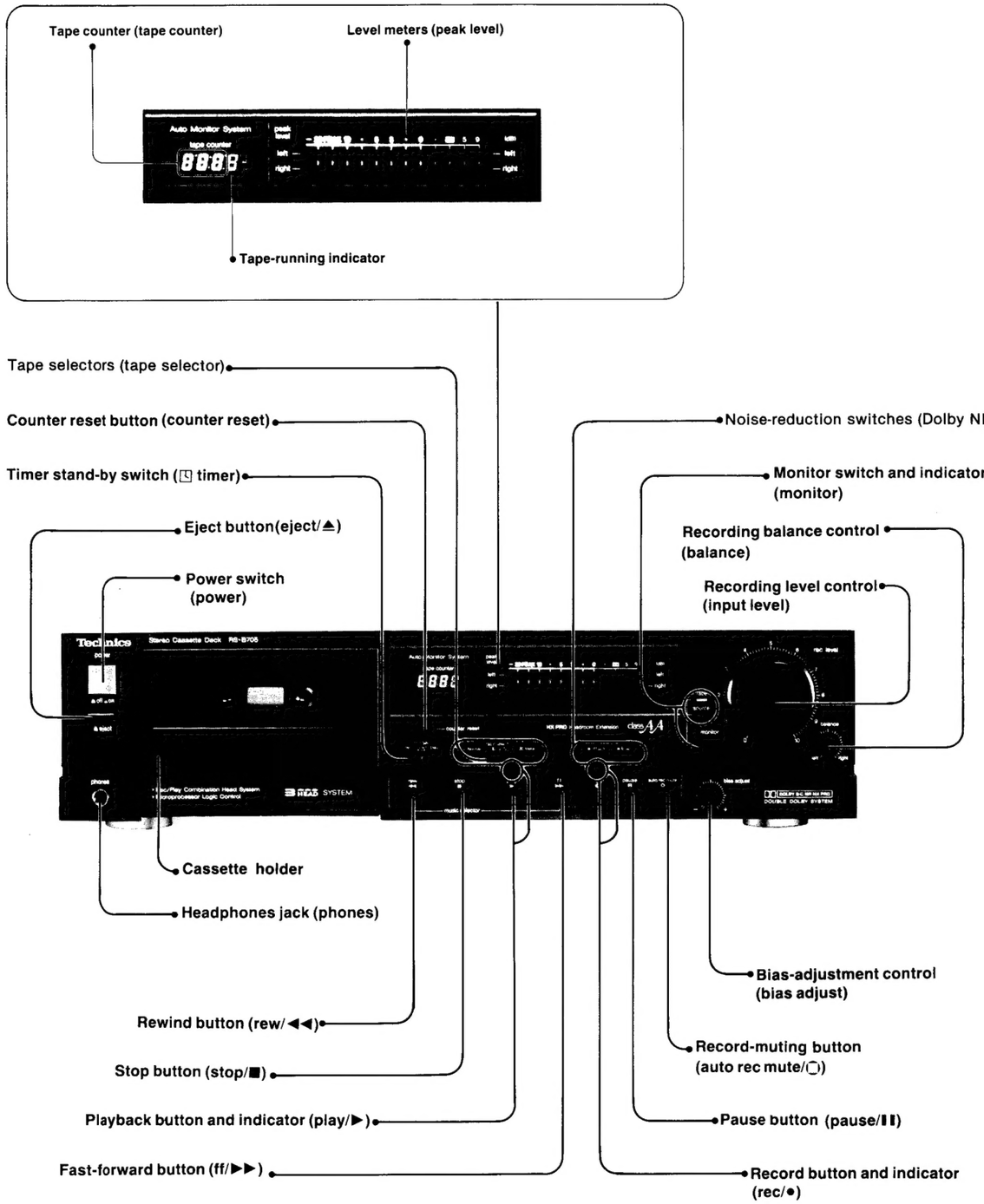
• AC plug...1 (SJP9215—[XA, XB])

# ■ LOCATION OF CONTROLS

## Rear Panel



## Front Panel






# TECHNICAL GUIDES

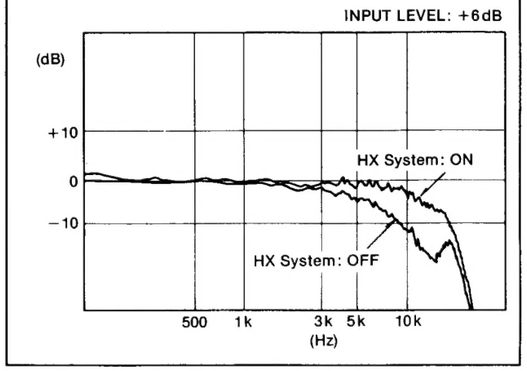
## Dolby HX Pro-Head Room Extension System

To record good quality sound, it is necesary to give bias current to the head.
The bias current has characteristics as follows:

- **Increasing the bias current reduces the distortion in low-frequency range but lowers the recording level in high-frequency range.**
- **Decreasing the bias current improves the recording level in high-frequency range but increases the distortion in low-frequency range.**

In the case of a common deck, a specific level of bias current is determined according to the characteristics of recording head. Therefore, bias current cannot be applied to the head according to the frequency levels of music signal.
In order to solve such problems, this unit employs "Dolby HX-Pro". It picks up the high frequency of music source changing at all times, and controls the bias current level according to the changing frequency. It serves to make the bias current level then most suited for the music source.
This system always operates in recording mode irrespective of the noise reduction system, but the dynamic range in record/playback can be further increased by using this system in combination with a noise reduction system. Particularly, combination with the dbx NR system mounted in this unit will double the MOL (Maximum Output Level) in high frequency range, which is suited for the record/playback of digital source as in CD.

**Dolby HX Pro System (NORMAL)**




## Bias Control Function

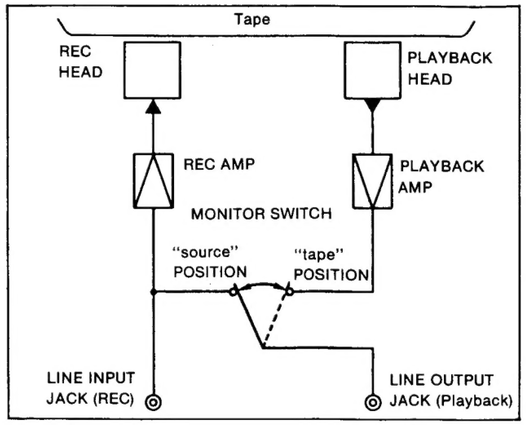
There are sometimes differences in playback output level even in case of same recording level or in sound quality even in case of same recording source.
This is because the characteristics of the cassette tape used are different with the makers and brands.
To solve this problem, this unit is furnished with bias control knob.
These knobs can be used to adjust the sound volume and quality while comparing the music signal (original sounds of record and tuner) and recorded signal (sound recorded on tape).
The comparison by hearing can be done by only one monitor switch because this unit is of 3-head type with record, playback and erase heads.

- **Bias control knob**
  Used to correct the high-frequency sound quality of music signal and recorded signal.

In this way, the record characteristics will not be distorted by tape, and the characteristics can be kept nearly uniform.

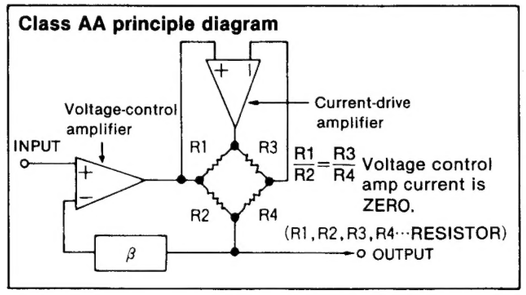
## Monitor Switch

In order to avoid faulty recording such as low sound level or distortion, it is very important to monitor the state of recording.
In the case of a common deck (2-head type), the sound that can be monitored during recording is always the sound before recording. So, when checking the state of actual recording, you have to rewind the tape and play it back.
This unit is of 3-head type, and the record head is independent of the playback head. Also, the sound before recording can be compared with the recorded sound by use of the monitor switch, therefore the state of recording can be easily checked.




## <class AA> Circuit Recording Equalizer Amp

Recording equalizer amp is an amplifier to supply recording current to the head. Usually, loads such as recording head and bias trap circuit (bias current control circuit) are added to the amplifier. Therefore, the current phase and voltage phase are fluctuated causing the recording signal to be distorted. This unit employs "class AA" amp in which two types of amplifier circuits (voltage control amp and current supply amp) different in amplifying system. This recording equalizer amplifier is not influenced by the fluctuation of current phase or voltage phase as mentioned above, and is excellent in waveform response.




## Operation Principles of Noise Reduction System

### ● Dolby NR B type, C type

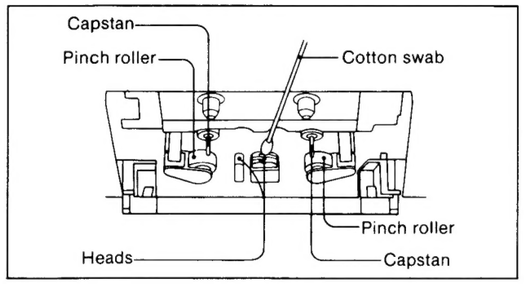
The level of hiss noise generated during playback is constant.
So, it is more offensive to the ear when the music signal level is lower.

Accordingly, raising the signal level during recording and lowering the level during playback will result in reduction of noise generated by the tape.
Dolby NR B type does it in high frequency range, and C type, in high and medium frequency ranges.



## Head care

To assure sound quality for recording and playback, be sure to clean the heads after approximately every 10 hours of use.
1) Press the power switch to switch off the electrical power supply of the cassette tape deck.
2) Press the eject button to open the cassette holder.
3) Clean the heads, pinch roller and the capstan shaft with a cotton swab (or with a soft, lint-free cloth) slightly moistened with alcohol.
   Do not use any solution other than alcohol for head cleaning.




## Head demagnetization

In order to maintain good sound quality during recording and playback, it is recommended that the head assembly be demagnetized when distortion or poor sound quality persist after cleaning the heads.
If the head assembly becomes magnetized, it could create noise in the recordings, loss of high-frequency response or erasure of valuable recordings. Several types of head demagnetizers are available and may be purchased separately at local electronics supply stores. Follow the instructions that are supplied with the device.
- Do not bring any type of metal objects or tools such as magnetic screwdrivers in contact with the head assembly.

## Maintenance of external surfaces

To clean this unit, use a soft, dry cloth.
If the surfaces are extremely dirty, use a soft cloth, dipped into a soap-and-water solution or a weak detergent solution.
Wring the cloth well before wiping the unit.
Wipe once again with a soft, dry cloth.
Never use alcohol, paint thinner, benzine, nor a chemically treated cloth to clean this unit.
Such chemicals may damage the finish of your unit.

# ■ DISASSEMBLY INSTRUCTIONS

**"ATTENTION SERVICER"**

Some chassis components may have sharp edges. Be careful when disassembling and servicing.

| Ref. No. 1 | How to remove the cabinet |
|---|---|
| Procedure 1 | • Remove the 5 screws. |

| Ref. No. 2 | How to remove the main P.C.B. and the power P.C.B. |
|---|---|
| Procedure 1→2 | • Remove the 5 screws (❶~❺).<br>• Remove the main P.C.B.<br>• Remove the connection rod.<br>• Remove the 5 screws (❻~❿).<br>• Remove the power P.C.B. |

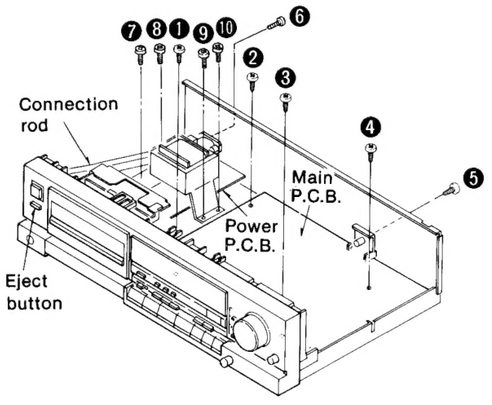



Fig. 1

| Ref. No. 3 | How to remove the FL meter P.C.B. |
|---|---|
| Procedure 1→3 | • Remove the 4 screws (❶~❹), and then remove the angle.<br>• Pull out the input level control knob and the balance control knob.<br>• Remove the 2 screws (❺, ❻).<br>• Push the 2 tabs. |

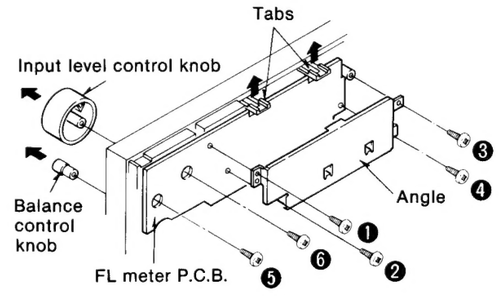



Fig. 2

ORDER NO. HAD8705138C8-A

# Dolby B-C NR-Equipped Stereo Cassette Deck

## DEUTSCH

Verwenden Sie bitte diese Broschüre Zusammen mit der Service-Anleitung für das Modell Nr. RS-B705

## ■ MESSUNGEN UND EINSTELL METHODEN

**Meßinstrumente**

- Elektronisches Voltmeter(EVM)
- Oszilloskop
- Digitaler Frequenzmesser
- Audiofrequenz-Oszillator
- Dämpfungswiderstand
- Gleichstrom-Voltmeter
- Widerstand (600Ω)

### Tonkopf-Azimuteinstellung

1.Spielen Sie auf dem Testband (QZZCFM) den Teil für die Azimuteinstellung (8 kHz, -20dB) ab. Drehen Sie die Azimuteinstellschraube so lange, bis die Abgaben des L-K und R-K den Höchstwert erreichen, und die Lissajoussche wellenfigur sich, wie abgebildet, 0 Grad nähert.

**Anmerkung:**

When L-K und R-K nicht auf demselben Punkt ihren Höchstwert erreichen, stellen Sie beide Kanäle auf den jeweiligen Höchstwert und gleichen dann aus.

2.Nehmen Sie denselben Einstellvorgang in der Wiedergabestellung vor.

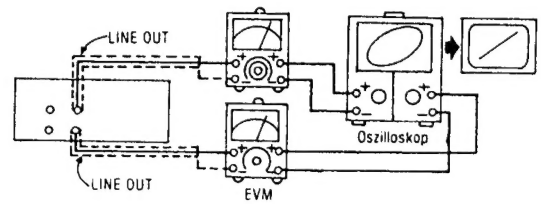



**Abb. 1**

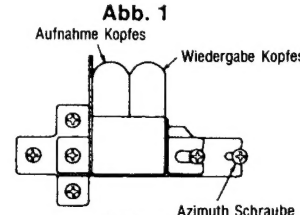



**Abb. 2**

### Bandgeschwindigkeitseinstellung

1.Spielen Sie den Mittelteil des Testbands (QZZCWAT) ab.
2.Stellen Sie den **VR** im Motor **(Siehe Abb. 3)** so ein, daß die Abgabe den Normwert erfüllt.

**Normwert: 3000 + 15, -10Hz**

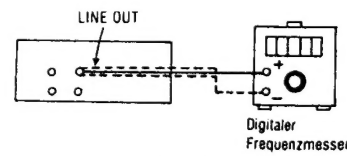



**Abb. 3**

### Einstellung der Wiedergabeverstärkungsregelung

1.Spielen Sie auf dem Testband (QZZCFM) den Teil für die Einstellung der Verstärkungsregelung (315 Hz, 0 dB) ab.
2.Stellen Sie **VR1** (L-K) und **VR2** (R-K) so ein, daß die Abgabe den Normwert erfüllt.

**Normwert: 0.4V ± 0.02V**

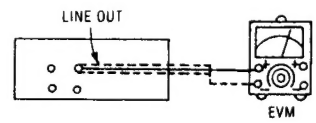



**Abb. 4**

## Wiedergabefrequenzgang

1.Spielen Sie auf dem Testband (QZZCFM) den Teil für den Frequenzgang (315Hz, 12,5kHz~63Hz, -20dB) ab.
2.Achten Sie darauf, daß der Frequenzgang für beide Kanäle (L-K, R-K) in dem in **Abb. 6** gezeigten Bereich liegt.

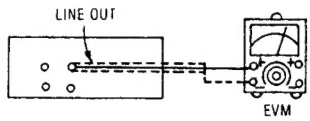



**Abb. 5**

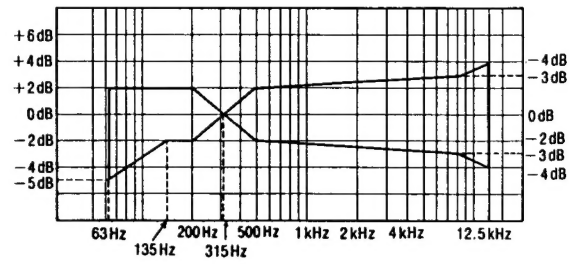



**Abb. 6**

## Justierung des Fluoreszenzmeters

1.Eine Normal band-Leercassette (QZZCRA) einsetzen und im Auf-nahmepause-Zustand des Gerätes das Referenz-Eingangspegelsignal (1kHz, -24dB) eingeben.
2.Die Ausgangsleistung mit dem Dämpfungswiderstand auf 0.4V justieren.
3.Den **VR51** (L-K) und **VR52** (R-K) so justieren, daß der 0dB-Segmentteil halb beleuchtet ist.

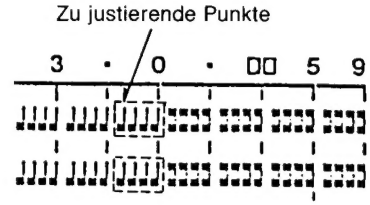



**Abb. 7**

## Gesamtfrequenzgang

1.Legen Sie das normale Leertestband (QZZCRA) ein und stellen das Gerät auf Aufnahme-/Pause-Betrieb.
2.Geben Sie über einen Lautstärkeregler ein Bezugseingabesignal(1 kHz, -24 dB) ein.
3.Stellen Sie das Signal auf 20 dB und justieren die Frequenz von 50 Hz ~ 14 kHz.
4.Nehmen Sie das Wobbelsignal auf.
5.Geben Sie das aufgenommene Signal wieder und achten darauf, daß dieses sich im Vergleich zur Bezugsfrequenz (1 kHz) in dem in **Abb. 9** aufgezeichneten Bereich befindet.
6.Sollte das Signal nicht im Normbereich liegen, justieren Sie **VR301** (L-K) und **VR302** (R-K) so, daß der Frequenzpegel mit der Norm übereinstimmt.
- Nach oben im Hochfrequenzbereich ausgleichen....Den vormagnetisierungsstrom anheben.
- Nach unten im Hochfrequenzbereich ausgleichen...Den vormagnetisierungsstrom senken.

7.Wiederholen Sie die Schritte 2 ~ 6 und verwenden das $CrO_2$ Band (QZZCRX) und das Metallband (QZZCRZ). Der Frequenzbereich wird auf 15 kHz (50 Hz ~ 15 kHz) angehoben.
8.Achten Sie darauf, daß sich der Frequenzpegel in dem in **Abb. 10** aufgezeigten Bereich befindet.

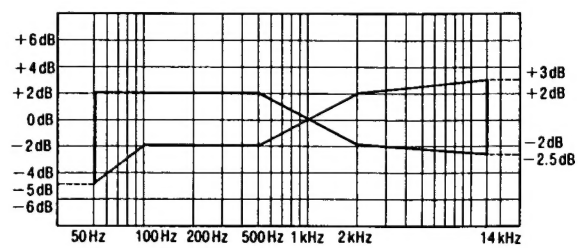



**Abb. 9**

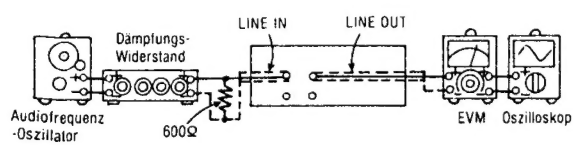



**Abb. 8**

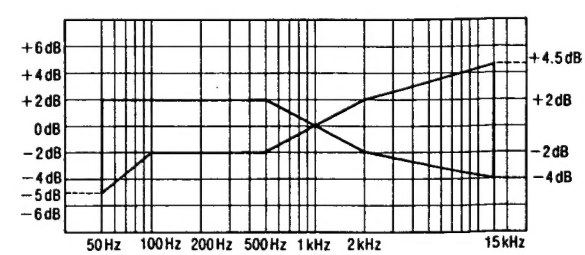



**Abb. 10**

## Einstellung der Gesamtverstärkungsregelung

1.Legen Sie das normale Leertestband (QZZCRA) ein und stellen das Gerät auf Aufnahme-/Pause-Betrieb.
2.Legen Sie ein Bezugseingabesignal (1 kHz, -24 dB) an. Stellen Sie das Ausgangssignal auf einen Pegel von 0.4 V ein.
3.Nehmen Sie das Eingabesignal auf.
4.Geben Sie das in Schritt 3 oben aufgenommene Signal wieder und achten Sie darauf, daß das Ausgangssignal mit dem Normwert übereinstimmt.
5.Sollte der Wert nicht innerhalb der Norm liegen, justieren Sie **VR151** (L-K) und **VR152** (R-K).
6.Wiederholen Sie die Schritte 2 ~ 5 von oben so lange, bis das Ausgangssignal im Normbereich liegt.

**Normwert: 0.4V ± 0.5dB**

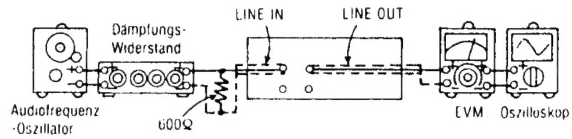



**Abb. 11**

## HX-PRO Einstellung

1.Legen Sie das Metalleertestband (QZZCRZ) ein und stellen das Gerät auf Aufnahme-/Pause-Betrieb.
2.Schalten Sie ein Gleichspannungsvoltmeter parallel zu **R325** (L-K, 10Ω, **TP3** ) und **R326** (R-K, 10Ω, **TP4** ).
3.Stellen Sie **L303** (L-K) und **L304** (R-K) so ein, daß die Spannung < 110 mV Gleichspannung beträgt.

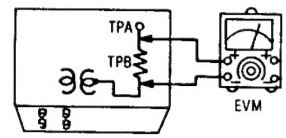



**Abb. 12**

**TPA = [TP3 (L-K), TP4 (R-K)]**
**TPB = [R325 (L-K), R326 (R-K)]**

# FRANÇAIS

Ceci est à utiliser conjointement avec manuel d'entretien du modèle No. RS-B705

## ■ METHODES DES MEASURES ET REGLAGES

**Apparelis de mesurage**

- Voltmètre électronique
- Oscilloscope
- Compteur de fréquence numérique
- Oscillateur de fréquence audio
- A.T.T.(Atténuateur)
- Voltmètre à C.C.
- Résistance (600Ω)

### Reglage Azimutal de la tete

1.Faire jouer la portion du réglage de l'azimuth (8 kHz, -20 dB) de la bande d'essai (QZZCFM). Ajuster la vis de la mise au point azimutale jusqu'à de que les sorties du canal de gauche et du canal de droite soient maximisées et que la forme d'onde de Lissajous, comme il est illustré, approche de 0 degré.

Nota:
Si le canal de gauche et canal de droite ne sont pas maximisés au même point, régler le point où les niveaux de chaque canal sont maximisés et égaux.

2.Effectuer le même réglage sur le mode d'audition.

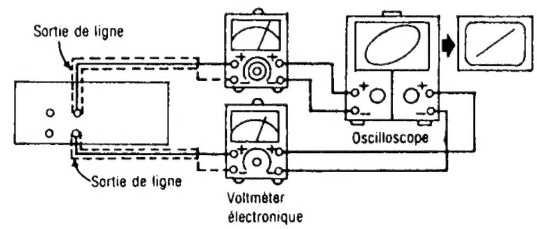



**Fig. 1**

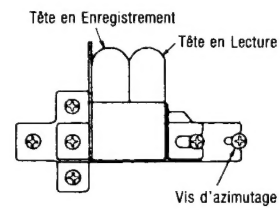



**Fig. 2**

### Reglage de la Vitesse de Defilement

1.Faire jouer la portion médiane de la bande d'essai (QZZCWAT).

2.Régler le régulateur de tension dans le moteur **(voir Fig. 3)**, de telle sorte que la sortie soit en deçà de la valeur standard.

**Valeur standard: 3000 + 15, -10Hz**

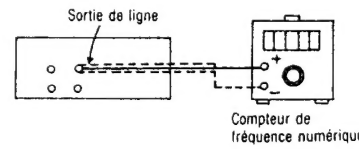



**Fig. 3**

### Reglage de L'amplification de Lecture

1.Faire jouer la partie réglée de l'amplification (315 Hz, 0 dB) de la bande d'essai (QZZCFM).

2.Régler **VR1** (canal de gauche) et **VR2** (canal de droite) de telle sorte que la sortie soit en deçà de la valeur standard.

**Valeur standard: 0.4V ± 0.02V**

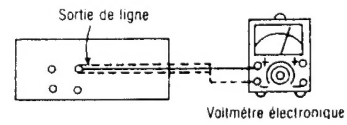



**Fig. 4**

## Reponse en Frequence de la Lecture

1.Faier jouer la partie de la réponse en fréquence (315 Hz, 12.5 kHz, -63 Hz, -20 dB) de la bande d'essai (QZZCFM).
2.S'assurer que la réponse en fréquence soit en deçà de la plage montrée dans la **Fig. 6**, à la fois pour le canal de gauche et le canal de droite.

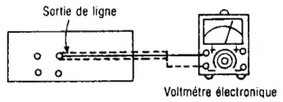



**Fig. 5**

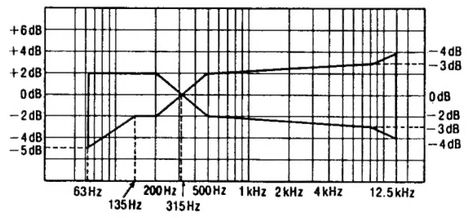



**Fig. 6**

## Réglage du compteur fluorescent

1.Installer une bande vierge normale (QZZCRA) et appliquer le signal du niveau d'entrée de référence (1kHz, -24dB) sur le mode d'intermission d'enregistrement.
2.Régler la puissance de sortie sur 0,4V avec l'atténuateur.
3.Régler **VR51** (canal de gauche) et **VR52** (canal de droite) de telle sorte que la partie segmentée de 0dB soit à moitié éclairée.

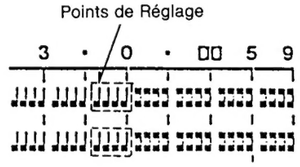



**Fig. 7**

## Reponse en Frequence Totale

1.Introduire la bande d'essai vierge normale (QZZCRA) et régler l'appareil sur le mode d'intermission d'un disque.
2.Appliquer un signal d'entrée de référence (1 kHz, -24 dB) par l'intermédiaire d'un atténuateur.
3.Diminuer le signal de 20 dB et régler la fréquence de 50 Hz ~ 14 kHz.
4.Enregistrer le balayage de fréquence.
5.Faire jouer le signal enregistré et s'assurer qu'il soit en deçà de la plage montrée à la **Fig. 9** en comparaison à la fréquence de référence (1 kHz).
6.S'il n'est pas en deçá de la plage standard, régler **VR301** (canal de gauche) et **VR302** (canal de droite) de telle sorte que le niveau de fréquence soit en deçá de la plage standard.
- Elévation du niveau dans la plage de fréquence élevée..... Augmente le courant de polarisation.
- Diminution du niveau dans la plage de fréquence élevée..... Diminue le courant de polarisation.

7.Répéter les étapes 2 ~ 6 ci-dessus en utilisant la band $CrO_2$ (QZZCRX) et la bande métallisée (QZZCRX) en augmentant la plage de fréquence à 15 kHz (50 Hz ~ 15 kHz).
8.S'assurer que le niveau soit en deçà de la plage montrée à la **Fig. 10**.

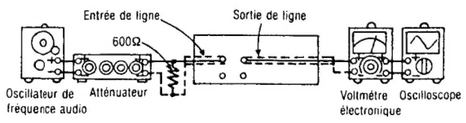



**Fig. 8**

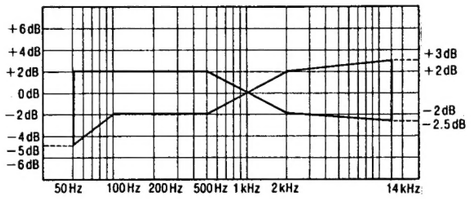



**Fig. 9**

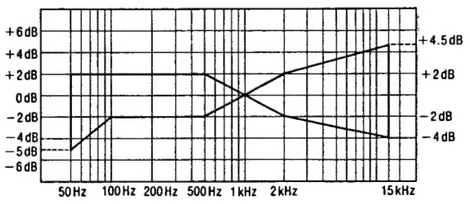



**Fig. 10**



## Reglage de L'amplification Totale

1.Introduire la bande d'essai vierge normale (QZZCRA) et régler l'appareil sur le mode d'intermission d'un disque.
2.Appliquer un signal d'entrée de référence (1 kHz, -24 dB). Diminuer la sortie de telle sorte que son niveau devienne de 0.4 V.
3.Enregistrer ce signal d'entrée.
4.Faire jouer le signal enregistré à l'étape 3 ci-dessus, et s'assurer que la sortie en deçè de la valeur standard.
5.Si elle n'est pas en deçà de la valeur standard, régler **VR151** (canal de gauche) et **VR152** (canal de droite).
6.Répéter les étapes 2 ~ 5 ci-dessus jusqu'à ce que la sortie soit en deçà de la valeur standard.

**Valeur standard: 0.4V ± 0.5dB**

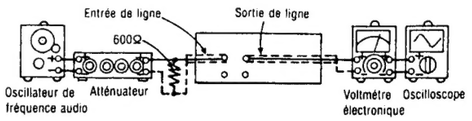



**Fig. 11**

## Reglage de HX-PRO

1.Introduire la bande vierge métallisée (QZZCRZ) et régler l'appareil sur le mode d'intermission d'un disque.
2.Raccorder un voltmètre à C.C. à travers **R325** (canal de gauche, 10 ohms, **TP3** ) et **R326** (canal de droite, 10 ohms, **TP4** ).
3.Régler **L303** (canal de gauche)et **L304** (canal de droite) de telle sorte que la tension soit inférieure à 110 mV C.C.

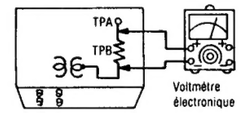



**Fig. 12**
**TPA.... TP3 (canal de gauche)**
TP4 (canal de droite)
**TAB.... R325 (canal de gauche)**
R326 (canal de droite)

# ESPAÑOL

Sirvase utilizarse junto con manual de servicio para el model No. RS-B705

## ■ METODOS DE AJUSTE Y MEDIDA

**Instrumento de medición**

- EVM(Voltímetro electrónico)
- Osciloscopio
- Frecuencímetro digital
- Oscilador AF
- ATT(Atenuador)
- Voltímetro CC
- Resistor(600Ω)

### Azuste Azimutal de Cabeza

1.Reproducir la porción de ajuste azimutal (8 kHz, -20 dB) de la cinta de prueba (QZZCFM). Variar el tornillo de ajuste azimutal hasta que las salidas del CH-I y CH-D se maximicen y la forma de onda de lissajous, como ilustrado, se acerque a grado 0.

Nota:

Si CH-I y CH-D no son maximizados en el mismo punto, ajustar al punto donde los niveles de cada canal sean maximizados e igualados.

2.Efectuar el mismo ajuste en la modalidad de reproducción.

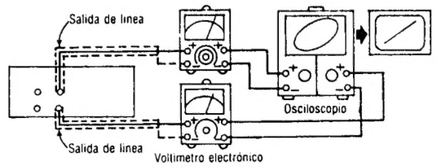



Fig. 1

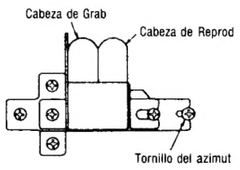



Fig. 2

### Ajuste de Velocidad de Cinta

1.Reproducir la porción media de la cinta prueba (QZZCWAT).

2.Ajustar el **VR** en el motor **(ver la Fig. 3)** de manera que salida esté dentro del valor estándar.

**Valor estándar: 3000 + 15, -10Hz**

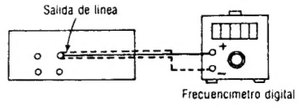



Fig. 3

### Ajuste de Ganancia de Reproduccion

1.Reproducir la porción ajustada de ganancia (315 Hz, 0 dB) de la cinta de prueba (QZZCFM).

2.Ajustar **VR1** (CH-I) y **VR2** (CH-D) de manera que la salida esté dentro del valor estándar.

**Valor estándar: 0.4V ± 0.02V**

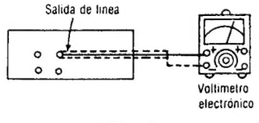



Fig. 4



### Respuesta de Frecuencia de Reproduccion

1.Reproducir la parte de respuesta de frecuencia de reproducción (315 Hz, 12.5 kHz ~ 63 Hz, -20 dB) de la cinta de prueba (QZZCFM).

2.Asegurarse de que la respuesta de frecuencia esté dentro de la gama mostrada en la **Fig. 6** para ambos CH-I y CH-D.

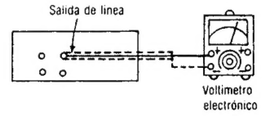



Fig. 5

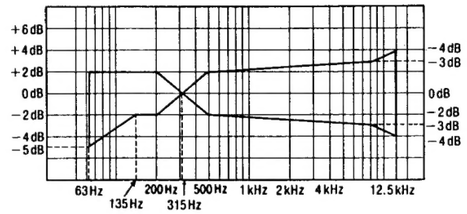



Fig. 6

### Ajuste de medidor fluorescente

1.Colocar una cinta virgen normal(QZZCRA) y aplicar la señal de nivel de entrada de referencia(1kHz, -24dB) en la modalidad de pausa de grabación.

2.Ajustar la salida a 0.4V mediante atenuador.

3.Ajustar **VR51** (CH-I) y **VR52** (CH-D) de manera que la parte de segmento 0dB esté medio iluminada.

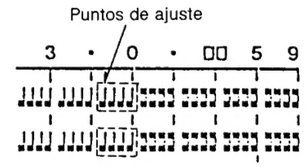



Fig. 7

### Respuesta de Frecuencia Total

1.Poner una cinta virgen normal (QZZCRA) y poner la unidad en la modalidad de Pausa de Grabación.

2.Aplicar la señal de entrada de referencia (1 kHz, -24 dB) a través de un atenuador.

3.Atenuar la señal por 20 dB y ajustar la frecuencia de 50 Hz ~ 14 kHz.

4.Grabar el barrido de frecuencia.

5.Reproducir la señal grabada y asegurarse de que esté dentro de la gama mostrada en la **Fig. 9** en comparación con la frecuencia de referencia (1 kHz).

6.Si no está dentro de la gama de frecuencia, ajustar **VR301** (CH-I) y **VR302** (CH-D) de manera que el nivel de frecuencia esté dentro de la gama estándar.

- Subir el nivel en la gama de frecuencia alta..... Incrementar la corriente de polarización.
- Bajar el nivel en la gama de frecuencia baja..... Disminuir la corriente de polarización.

7.Repetir los pasos 2 ~ 6 de arriba utilizando la cinta $CrO_2$ (QZZCRX) y la cinta metálica (QZZCRZ) incrementando la gama de frecuencia a 15 kHz (50 Hz ~ 15 kHz).

8.Asegurarse de que el nivel esté dentro de la gama mostrada en la **Fig. 10**.

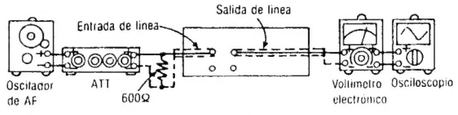



Fig. 8

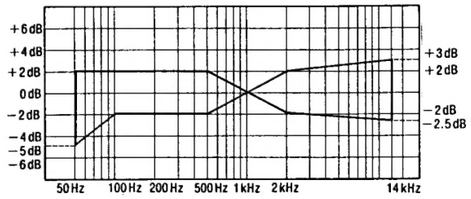



Fig. 9

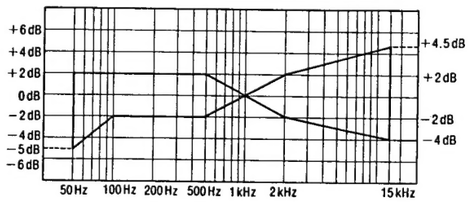



Fig. 10

| Ref. No. 4 | How to remove the timer P.C.B. and the bias adjust P.C.B. |
|---|---|
| Procedure 1→2→3→4 | • Remove the screw (❶) and then remove the timer P.C.B.<br>• Remove the screw (❷).<br>• Pull out the bias adjust knob.<br>• Remove the bias adjust P.C.B. |

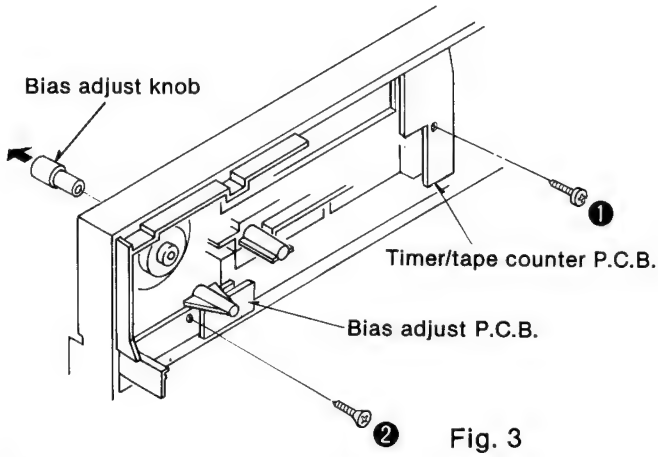



Fig. 3

| Ref. No. 5 | How to remove the mechanism unit |
|---|---|
| Procedure 1→5 | • Remove the screw (❻) (See the Fig. 5).<br>• Remove the 5 screws (❶~❺).<br>• Push the eject button. |

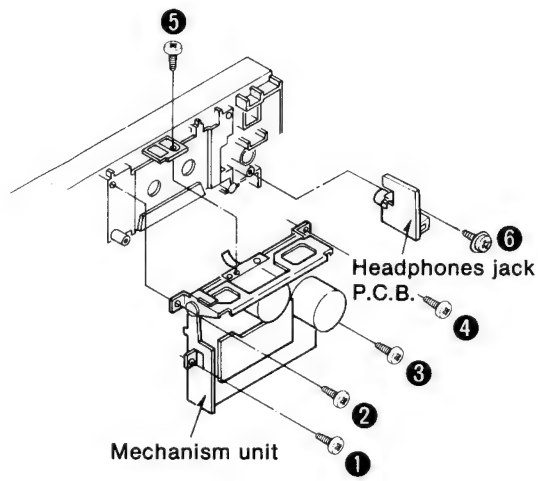



Fig. 4

| Ref. No. 6 | How to remove the headphones P.C.B. |
|---|---|
| Procedure 1→6 | • Remove the screw (❻). (See the Fig. 4). |

| Ref. No. 7 | How to remove the operation switch P.C.B. |
|---|---|
| Procedure 1→7 | • Remove the 5 screws (❶~❺) |

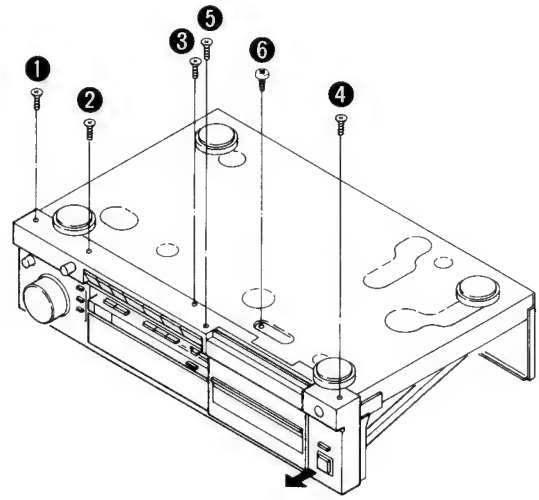



Fig. 5

• Remove the screw (❼).
• Pull out the input level control knob and the balance control knob. (See the Fig. 2).
• Push the 3 tabs (ⓐ) and then remove the front panel.
• Push the 2 tabs (ⓑ).

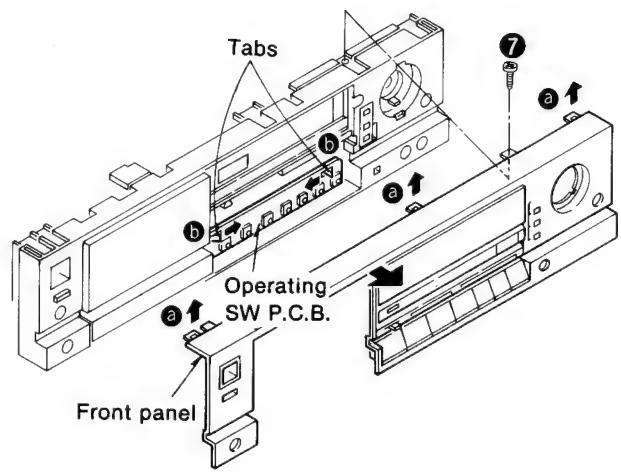



Fig. 6

# MEASUREMENT AND ADJUSTMENT METHODES

**Measurement Condition**

- Input level controls; Maximum
- Timer start switch; Off
- Noise reduction select switch; Off
- Repeat-play switch; Off
- Multiplex filter switch; Off
- Make sure heads are clean
- Make sure capstan and pressure roller are clean
- Judgeable room temperature 20±5°C(68±9°F)

**Measuring instrument**

- EVM(Electronic Voltmeter)
- Oscilloscope
- Digital frequency counter
- AF oscillator
- ATT(Attenuator)
- DC voltmeter
- Resistor (600Ω)

**Test tape**

- Head azimuth adjustment (8kHz, -20dB); QZZCFM
- Tape speed adjustment (3kHz, -10dB); QZZCWAT
- Playback frequency response (315Hz, 12.5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz, 63Hz, -20dB); QZZCFM
- Playback gain adjustment (315Hz, 0dB); QZZCFM
- Overall frequency response, Overall gain adjustment
  Normal reference blank tape;QZZCRA
  $CrO_2$ reference blank tape; QZZCRX
  Metal reference blank tape; QZZCRZ

## HEAD AZIMUTH ADJUSTMENT

1.Playback the azimuth adjusment portion (8 kHz, -20 dB) of the test tape (QZZCFM). Vary the azimuth adjusting screw until the outputs of the L-CH and R-CH are maximized and the lissajous waveform, as illustrated, approaches 0 degrees.

**Note:** If L-CH and R-CH are not maximized at the same point, adjust to the point where the levels of each channel are maximized and equal.

2.Perform the same adjustment in the play mode.

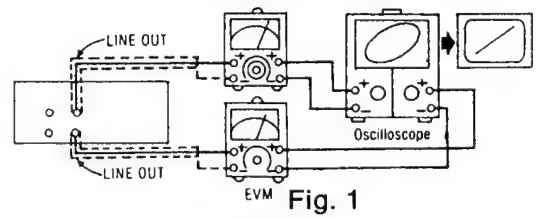


Fig. 1

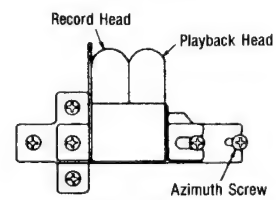


Fig. 2

## TAPE SPEED ADJUSTMENT

1.Playback the middle portion of the test tape (QZZCWAT).

2. Adjust the **VR** in the motor **(see Fig. 3)** so that the output is within the standard value.
within the standard value.

**Standard value: $3000^{+15}_{-10}$ Hz**

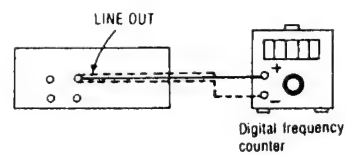


Fig. 3

## PLAYBACK GAIN ADUJSTMENT

1.Playback the gain adjusted portion (315 Hz, 0 dB) of the test tape (QZZCFM).

2.Adjust VR1 (L-CH) and VR2 (R-CH) so that the output is within the standard value.

**Standard value: 0.4±0.02V**

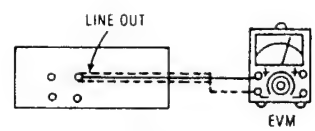


Fig. 4

## PLAYBACK FREQUENCY RESPONSE

1.Playback the frequency response portion (315 Hz, 12.5 kHz ~ 63 Hz, -20 dB) of the test tape (QZZCFM).

2.Assure that the frequency response is within the range shown in **Fig. 6** for both L-CH and R-CH.

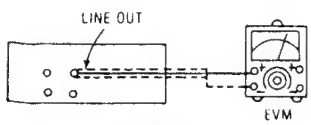


Fig. 5

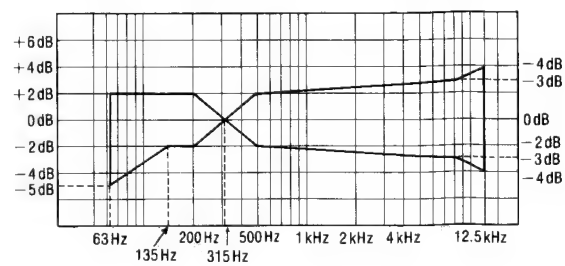


Fig. 6

### Ajuste de Ganancia Total

1.Insertar la cinta de prueba en blanco normal (QZZCRA) y poner la unidad en modalidad de pausa de Grabación.
2.Aplicar la señal de entrada de referencia (1 kHz, -24 dB). Atenuar la salida de manera que su nivel se haga 0.4 V.
3.Grabar la señal de entrada.
4.Reproducir la señal grabada en el paso 3 de arriba y asegurarse de que la salida esté dentro del valor estándar.
5.Si no está dentro del valor estándar, ajustar **VR151** (CH-I) y **VR152** (CH-D).
6.Repetir el paso 2 ~ 5 de arriba hasta que la salida esté dentro del valor estándar.

**Valor estándar: 0.4V ± 0.5dB**

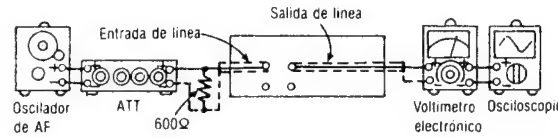



**Fig. 11**

### Ajuste de HX-PRO

1.Insertar la cinta en blanco metálica (QZZCRZ) y poner la unidad en la modalidad de pausa de Grabación.
2.Conectar un voltímetro CC través de **R325** (CH-I, 10 ohmios, **TP3** ) y **R326** (CH-D, 10 ohmios, **TP4** ).
3.Ajustar **L303** (CH-I) y **L304** (CH-D) de manera que la tensión se haga menos de 110 mV CC.

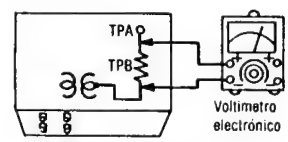



**Fig. 12**

**TPA = [TP3 (CH-I), TP4 (CH-D)]**
**TPB = [R325 (CH-I), R326 (CH-D)]**



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## FLUORESCENT METER ADJUSTMENT

1. Set a normal blank tape (QZZCRA) and apply the reference input level signal (1 kHz, −24 dB) in record pause mode.
2. Adjust the output to 0.4 V by attenuator.
3. Adjust **VR51** (L-CH) ⟦**VR52** (R-CH)⟧ so that the 0 dB segment part is half lighted.

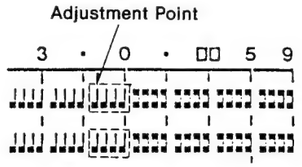



Fig. 7

## OVERALL FREQUENCY RESPONSE

1. Insert the Normal blank test tape (QZZCRA) and set the unit to the Record Pause mode.
2. Apply a reference input signal (1 kHz, -24 dB) through an attenuator.
3. Attenuate the signal by 20 dB and adjust the frequency from 50 Hz ~ 14 kHz.
4. Record the frequency sweep.
5. Playback the recorded signal and assure that it is within the range shown in **Fig. 9** in comparison to the reference frequency (1 kHz).
6. If it is not within the standard range, adjust VR301 (L-CH) and VR302 (R-CH) so that the frequency level is within the standard range.
   - Level up in high frequency range.....Increase the bias current.
   - Level down in high frequency range...Decrease the bias current.
7. Repeat steps 2 ~ 6 above using the $CrO_2$ tape(QZZCRX) and the Metal tape(QZZCRZ) increasing the frequency range to 15 kHz (50 Hz ~ 15 kHz).
8. Assure that the level is within the range shown in **Fig. 10**.

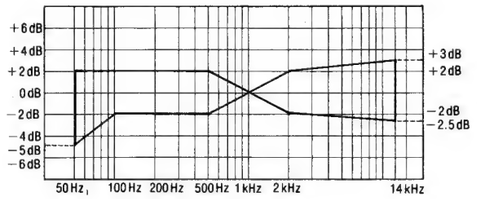



Fig. 9

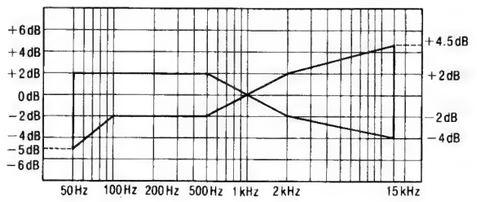



Fig. 10

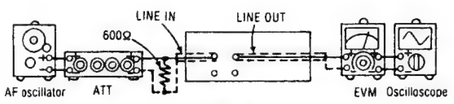



Fig. 8

## OVERALL GAIN ADJUSTMENT

1. Insert the Normal blank test tape (QZZCRA) and set the unit to the Record pause mode.
2. Apply a reference input signal (1 kHz, -24 dB). Attenuate the output so that its level becomes 0.4 V .
3. Record this input signal.
4. Playback the signal recorded in step 3 above , and assure that the output is within the standard value.
5. If it is not within the standard value, adjust VR151 (L-CH) and VR152 (R-CH).
6. Repeat the step 2 ~ 5 above until the output is within the standard value.

**Standard value: 0.4V ± 0.5dB**

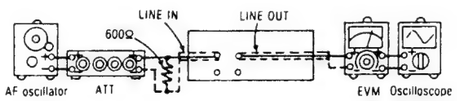



Fig. 11



## HX-PRO ADJUSTMENT

1. Insert the Metal blank tape (QZZCRZ) and set the unit to the Record Pause mode.
2. Connect a DC voltmeter across R325 (L-CH., 10 ohms, TP3) and R326 (R-CH., 10 ohms, TP4).
3. Adjust L303 (LCH) and L304 (RCH) so that the voltage becomes less than 110 mV DC.

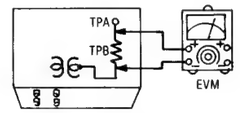



Fig. 12

TPA { TP3 (L-CH) / TP4 (R-CH) }  TPB { R325 (L-CH) / R326 (R-CH) }

- **Adjustment point**

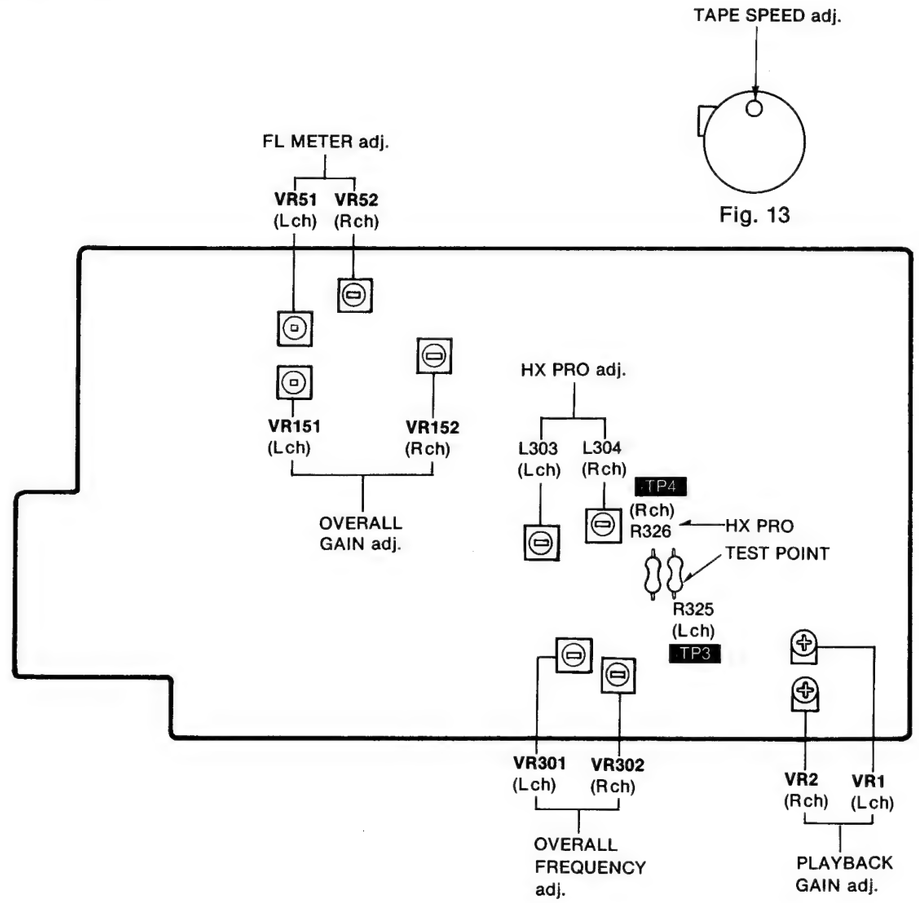
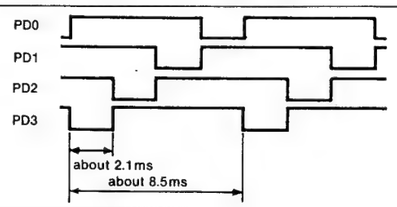


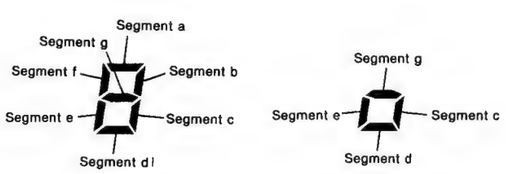

Fig. 13

## ■ MICROCOMPUTER TERMINAL FUNCTION AND WAVEFORM (IC901: LM6495G-2104)

| Terminal No. | Symbol | Function/operation |
|---|---|---|
| 1, 42 | XTAL | about 800kHz |
| 2 | PC0 | Scan input<br>Key scan matrix |
| 3 | PC1 | |
| 4 | PC2 | |
| 5 | PC3 | |
| 6 | $\overline{INT}$ | Connection of GND |
| 7 | $\overline{RES}$ | Reset the microcomputer when power switch is thrown in. Reset at "L". |
| 8 | PD0 | Scan output |
| 9 | PD1 | |
| 10 | PD2 | |
| 11 | PD3 | |
| 12 | PE0 | Pull up 5V |
| 13 | PE1 | • Segment a (PE1) |
| 14 | PE2 | • Segment b (PE2) |
| 15 | PE3 | • Segment c (PE3) |
| 16 | PF0 | • Segment d (PF0) |
| 17 | PF1 | • Segment e (PF1) |
| 18 | PF2 | • Segment f (PF2) |
| 19 | PF3 | • Segment g (PF3) |

| | PD0 | PD1 | PD2 | PD3 |
|---|---|---|---|---|
| PC0 | auto rec mute | rew | Timer play | REC INH SW |
| PC1 | pause | ff | Timer rec | PACK SW |
| PC2 | rec | — | monitor sw | — |
| PC3 | stop | play | Counter Reset sw | — |




- According to the internal command of IC, the counter number changes with 2 turns of the take-up reel. Also, the running display changes by 1 with 1/2 turn.
- Each waveform changes because of dynamic lighting.

| | | |
|---|---|---|
| 20 | TEST | Connection of GND |
| 21 | VSS | |
| 22 | PG0 | Connection of GND |
| 23 | PG1 | "L" when REC/REC PAUSE mode switch is on mode.<br>"L" when Timer REC mode is power on in about 1.25sec. |
| 24 | PG2 | "L" when REC switch is on mode. |
| 25 | PG3 | "L" when PLAY switch is on mode.<br>• MUSIC SELECTOR mode<br>• PAUSE mode |

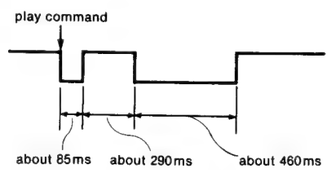


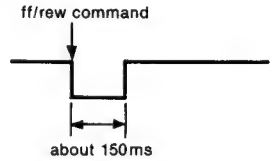
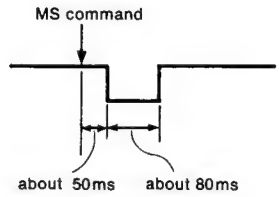
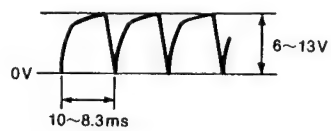

| Terminal No. | Symbol | Function/operation |
|---|---|---|
| 26 | PH0 | "L" when TAPE of MONITOR SELECTOR and POWER switch is on mode.<br>"L" when PLAY from STOP, PAUSE, FF, REW and MS is moving. (auto monitor select) |
| 27 | PH1 | "L" when SOURCE of MONITOR SELECT is ON mode.<br>"L" when REC PAUSE mode from STOP and PAUSE is moving. |
| 28 | MSP | MUSIC SELECTOR, NON RECORDED SPACE pulse input Record..."L"<br>Non-record..."H" |
| 29 | PH3 | Source mode..."L"<br>Tape mode..."H"<br>FF/REW/MS..."L" |
| 30 | PI0 | • Meter mute output..."L" (PI0) |
| 31 | PI1 | • Lineout mute output..."H" (PI1) |
| 32 | PI2 | • REC Amp mute output..."L" (PI2) |

| | | Stop Pause ff/rew | play | Rec pause | | Rec play | |
|---|---|---|---|---|---|---|---|
| | | | | Normal | A.R.M. | Normal | Auto Rec Mute |
| TAPE mode | PI0 | L | H | L | L | H | L |
| | PI1 | H | L | H | H | L | L |
| | PI2 | L | L | L | L | H | L |
| SOURCE mode | PI0 | H | H | H | L | H | L |
| | PI1 | L | L | L | L | L | L |
| | PI2 | L | L | L | L | H | L |

PI0, PI2 { "H"=Muting OFF / "L"=Muting ON  PI1 { "H"=Muting ON / "L"=Muting OFF

| | | |
|---|---|---|
| 33 | PA0 | FF/REW motor speed control<br>PLAY mode..."L" |
| 34 | PA1 | FF/REW motor drive<br>REW mode..."H" |
| 35 | PA2 | FF/REW motor drive<br>FF mode..."H" |
| 36 | PA3 | Capstan motor drive<br>STOP/PAUSE/FF/REW/MS mode..."H"<br>PLAY mode..."L" |
| 37 | PB0 | Plunger drive<br>During music select mode, plunger attraction is maintained to keep Cue/Review mode. |
| 38 | PB1 | Plunger drive<br>Mechanism mode selector control output<br>• STOP...PLAY |



| Terminal No. | Symbol | Function/operation |
|---|---|---|
| 38 | PB1 | • STOP...FF/REW<br>  <br><br>• PLAY...MS<br>  <br> |
| 39 | PB2 | • Reel base pulse<br>Reel base rotation is detected by photo sensor. Pulses are used for tape-end detection and counter up/down. |
| 40 | POF | Power of DET<br>  <br> |
| 41 | $V_{DD}$ | Operative on about 5V |

# ■ RESISTORS & CAPACITORS

**Notes:** * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

**Numbering System of Resistor**

Example

| ERD | 25 | F | J | 102 |
|---|---|---|---|---|
| Type | Wattage | Shape | Tolerance | Value |

| ERX | 2 | AN | J | 471 |
|---|---|---|---|---|
| Type | Wattage | Shape | Tolerance | Value $47 \times 10^1$ (ohm) |

**Numbering System of Capacitor**

Example

| ECKD | 1H | 102 | Z | F |
|---|---|---|---|---|
| Type | Voltage | Value | Tolerance | Peculiarity |

| ECEA | 50 | M | 330 |
|---|---|---|---|
| Type | Voltage | Peculiarity | Value ($33 \times 10^0$ microfarad) |

| Resistor Type | Wattage | Tolerance |
|---|---|---|
| ERD : Carbon<br>ERG : Metal Oxide<br>ERX : Metal Film<br>ERQ : Fuse Type Metal<br>ERD□□L : Carbon (chip)<br>ERQ□□K : Metal Film (chip)<br>ERC : Solid | 10 : 1/8W<br>12 : 1/2W<br>25 : 1/4W<br>1A : 1W<br>18 : 1/8W<br>S2 : 1/4W<br>S1 : 1/2W<br>2F : 1/4W<br>50 : 1/2W<br>2A : 2W | J : ±5%<br>F : ±1%<br>G : ±2%<br>K : ±10% |

| Capacitor Type | Voltage | Tolerance |
|---|---|---|
| ECE : Electrolytic<br>ECCD : Ceramic<br>ECKD : Ceramic<br>ECQM : Polyester<br>ECQP : Polyproylene<br>ECG : Ceramic<br>ECEA□□□N: Non Polar Electrolytic<br>QCU□ : Ceramic (Chip Type)<br>ECUX : Ceramic (Chip Type)<br>ECF : Semiconductor<br>EECW : Liquid electrolyte double layer capcitor | 0J : 6.3V<br>1A : 10V<br>1C : 16V<br>1E : 25V<br>1H : 50V<br>1V : 35V<br>50 : 50V<br>05 : 50V<br>2H : 500V<br>2A : 100V<br>1 : 100V<br>KC: 400V AC<br>KC: 125VAC (UL)<br>1J : 63V | C : ±0.25pF<br>J : ±5%<br>K : ±10%<br>Z : +80% −20%<br>P : +100% −0%<br>M : ±20%<br>D : ±0.5pF<br>G : ±2% |

| Ref. No. | Part No. | Part Code |
|---|---|---|
| RESISTORS | | |
| R1, R2 | ERD25TJ683 | 001 152 0476 3 |
| R3, R4 | ERDS2TJ121 | 001 152 2349 1 |
| R9, R10 | ERDS2TJ124 | 001 152 2425 6 |
| R11, R12 | ERDS2TJ472 | 001 152 2362 4 |
| R13, R14 | ERD25FJ472 | 001 152 0311 3 |
| R15, R16 | ERD25FJ472 | 001 152 0311 3 |
| R18 | ERD25TJ183 | 001 152 1852 5 |
| R19, R20 | ERDS2TJ682 | 001 152 2365 1 |
| R21 | ERD25FJ103 | 001 152 0216 1 |
| R23, R24 | ERDS2TJ274 | 001 152 2437 2 |
| R25 | ERDS2TJ104 | 001 152 2348 2 |
| R50 | ERG2SJ820 | 001 151 5680 6 |
| R51 | ERD2FCG390 | 001 152 0195 9 |
| R52 | ERG2SJ820 | 001 151 5680 6 |
| R53, R54 | ERD25TJ104 | 001 152 1823 0 |
| R55 | ERDS2TJ223 | 001 152 2432 7 |
| R56 | ERDS2TJ473 | 001 152 2363 3 |
| R57, R58 | ERDS2TJ223 | 001 152 2432 7 |
| R61, R62 | ERD25TJ333 | 001 152 1887 4 |
| R63, R64 | ERDS2TJ104 | 001 152 2348 2 |
| R65, R66 | ERD2FCG121 | 001 152 0187 9 |
| R67, R68 | ERDS2TJ680 | 001 152 2448 9 |
| R71, R72 | ERDS2TJ122 | 001 152 2423 8 |
| R73, R74 | ERD25TJ333 | 001 152 1887 4 |
| R75, R76 | ERD25FJ821 | 001 152 0354 2 |
| R77 | ERD25FJ472 | 001 152 0311 3 |
| R79 | ERD2FCG470 | 001 152 0197 7 |
| R81 | ERD2FCG820 | 001 152 0200 9 |
| R91 | ERDS2TJ103 | 001 152 2347 3 |
| R92 | ERDS2TJ473 | 001 152 2363 3 |
| R93 | ERDS2TJ103 | 001 152 2347 3 |
| R101, R102 | ERDS2TJ223 | 001 152 2432 7 |
| R103, R104 | ERDS2TJ102 | 001 152 2346 4 |
| R151, R152 | ERDS2TJ472 | 001 152 2362 4 |
| R157 | ERDS2TJ102 | 001 152 2346 4 |
| R158 | ERD25FJ102 | 001 152 0215 2 |
| R159, R160 | ERDS2TJ103 | 001 152 2347 3 |
| R161, R162 | ERDS2TJ472 | 001 152 2362 4 |
| R163, R164 | ERDS2TJ121 | 001 152 2349 1 |
| R165, R166 | ERDS2TJ221 | 001 152 2431 8 |
| R167, R168 | ERDS2TJ330 | 001 152 2355 3 |
| R169, R170 | ERDS2TJ242 | 001 152 3150 0 |
| R171, R172 | ERDS2TJ221 | 001 152 2431 8 |
| R173, R174 | ERDS2TJ122 | 001 152 2423 8 |
| R175, R176 | ERDS2TJ122 | 001 152 2423 8 |
| R177, R178 | ERDS2TJ330 | 001 152 2355 3 |
| R179, R180 | ERDS2TJ332 | 001 152 2357 1 |
| R181, R182 | ERDS2TJ160 | 001 150 3019 2 |
| R183, R184 | ERDS2TJ102 | 001 152 2346 4 |
| R185, R186 | ERDS2TJ103 | 001 152 2347 3 |
| R191, R192 | ERDS2TJ103 | 001 152 2347 3 |
| R193 | ERDS2TJ103 | 001 152 2347 3 |
| R194 | ERDS2TJ472 | 001 152 2362 4 |
| R195, R196 | ERDS2TJ103 | 001 152 2347 3 |
| R201 | ERDS2TJ103 | 001 152 2347 3 |
| R202 | ERD25FJ682 | 001 152 0343 5 |
| R203 | ERD25FJ470 | 001 152 0309 7 |
| R204 | ERD25TJ683 | 001 152 0476 3 |
| R206 | ERDS2TJ473 | 001 152 2363 3 |
| R207 | ERD25FJ103 | 001 152 0216 1 |
| R208 | ERDS2TJ332 | 001 152 2357 1 |
| R209 | ERDS2TJ223 | 001 152 2432 7 |
| R210 | ERDS2TJ333 | 001 152 2358 0 |
| R301 | ERD25FJ1R0 | 001 152 0208 1 |
| R303, R304 | ERDS2TJ223 | 001 152 2432 7 |
| R305, R306 | ERD25FJ180 | 001 152 0246 5 |
| R307 | ERG2SJ221 | 001 151 3783 8 |
| R308 | ERG1SJ561P | 001 151 3003 5 |
| R315, R316 | ERDS2TJ154 | 001 152 2427 4 |
| R317, R318 | ERDS2TJ333 | 001 152 2358 0 |
| R319 | ERDS2TJ332 | 001 152 2357 1 |
| R322 | ERDS2TJ682 | 001 152 2365 1 |
| R323 | ERDS2TJ102 | 001 152 2346 4 |
| R324 | ERDS2TJ103 | 001 152 2347 3 |
| R325, R326 | ERD2FCG100 | 001 152 0185 1 |
| R331, R332 | ERD25FJ100 | 001 152 0213 4 |
| R333 | ERD25TJ473 | 001 152 1904 0 |
| R334 | ERD25FJ102 | 001 152 0215 2 |
| R401, R402 | ERDS2TJ102 | 001 152 2346 4 |
| R403, R404 | ERDS2TJ472 | 001 152 2362 4 |
| R409, R410 | ERDS2TJ332 | 001 152 2357 1 |
| R411, R412 | ERDS2TJ102 | 001 152 2346 4 |
| R413, R414 | ERDS2TJ333 | 001 152 2358 0 |
| R415, R416 | ERDS2TJ823 | 001 152 2456 9 |
| R417, R418 | ERDS2TJ152 | 001 152 2350 8 |
| R419, R420 | ERDS2TJ683 | 001 152 2450 5 |
| R421, R422 | ERDS2TJ222 | 001 152 2353 5 |
| R423, R424 | ERDS2TJ823 | 001 152 2456 9 |
| R430 | ERDS2TJ473 | 001 152 2363 3 |
| R431, R432 | ERD25FJ681 | 001 152 0342 6 |
| R433, R434 | ERDS2TJ103 | 001 152 2347 3 |
| R451, R452 | ERDS2TJ242 | 001 152 3150 0 |
| R453, R454 | ERDS2TJ274 | 001 152 2437 2 |
| R455, R456 | ERDS2TJ274 | 001 152 2437 2 |
| R457, R458 | ERDS2TJ472 | 001 152 2362 4 |
| R459, R460 | ERDS2TJ332 | 001 152 2357 1 |
| R461, R462 | ERDS2TJ102 | 001 152 2346 4 |
| R463, R464 | ERDS2TJ333 | 001 152 2358 0 |
| R465, R466 | ERDS2TJ823 | 001 152 2456 9 |
| R467, R468 | ERDS2TJ152 | 001 152 2350 8 |
| R469, R470 | ERDS2TJ683 | 001 152 2450 5 |
| R471, R472 | ERDS2TJ222 | 001 152 2353 5 |
| R473, R474 | ERDS2TJ823 | 001 152 2456 9 |
| R480 | ERDS2TJ473 | 001 152 2363 3 |
| R481, R482 | ERD25FJ681 | 001 152 0342 6 |
| R483, R484 | ERD25FJ103 | 001 152 0216 1 |
| R491 | ERD25FJ272 | 001 152 0273 2 |
| R601, R602 | ERD2FCJ4R7 | 001 152 2480 9 |
| R603 | ERDS2TJ561 | 001 152 2364 2 |
| R604 | ERD25FJ681 | 001 152 0342 6 |
| R607 | ERD25FJ332 | 001 152 0287 6 |
| R608 | ERDS2TJ272 | 001 152 2354 4 |
| R611, R612 | ERQ14LKR12E | |
| R613 ⚠ | ERD2FCG150 | 001 152 0188 8 |
| R614 ⚠ | ERD25FJ821 | 001 152 0354 2 |
| R701 | ERDS2TJ332 | 001 152 2357 1 |
| R702 | ERDS2TJ472 | 001 152 2362 4 |
| R703 | ERDS2TJ123 | 001 152 2424 7 |
| R711, R712 | ERDS2TJ103 | 001 152 2347 3 |
| R713 | ERDS2TJ103 | 001 152 2347 3 |
| R714 | ERDS2TJ682 | 001 152 2365 1 |
| R715 | ERDS2TJ102 | 001 152 2346 4 |
| R723 | ERDS2TJ681 | 001 152 2449 8 |
| R724 | ERDS2TJ271 | 001 152 2435 4 |
| R731, R732 | ERDS2TJ102 | 001 152 2346 4 |
| R733, R734 | ERDS2TJ102 | 001 152 2346 4 |
| R901 ⚠ | ERD2FCG390 | 001 152 0195 9 |

| Ref. No. | Part No. | Part Code |
|---|---|---|
| R902 ⚠ | ERD25FJ821 | 001 152 0354 2 |
| R904 | ERDS2TJ103 | 001 152 2347 3 |
| R905 | ERDS2TJ683 | 001 152 2450 5 |
| R906 | ERD25TJ105 | 001 152 0446 9 |
| R912, R913 | ERD25TJ473 | 001 152 1904 0 |
| R914, R915 | ERD25TJ473 | 001 152 1904 0 |
| R919, R920 | ERDS2TJ105 | 001 152 2422 9 |
| R921, R922 | ERDS2TJ122 | 001 152 2423 8 |
| R923 | ERDS2TJ122 | 001 152 2423 8 |
| R924, R925 | ERDS2TJ103 | 001 152 2347 3 |
| R927 | ERDS2TJ681 | 001 152 2449 8 |
| R928 | ERDS2TJ391 | 001 152 2360 6 |
| R931, R932 | ERDS2TJ103 | 001 152 2347 3 |
| R933 | ERD2FCJ5R6 | 001 152 0202 7 |
| R934 | ERDS2TJ103 | 001 152 2347 3 |
| R938 | ERD2FCJ5R6 | 001 152 0202 7 |
| R939 | ERDS2TJ392 | 001 152 2439 0 |
| R940 | ERDS2TJ561 | 001 152 2364 2 |
| R943 | ERDS2TJ103 | 001 152 2347 3 |
| R944 | ERDS2TJ223 | 001 152 2432 7 |
| R945 | ERDS2TJ682 | 001 152 2365 1 |
| R946, R950 | ERDS2TJ471 | 001 152 2361 5 |
| R955 | ERD25FJ103 | 001 152 0216 1 |
| CAPACITORS | | |
| C1, C2 | ECKD1H221KB | 001 103 1487 1 |
| C3, C4 | ECCF1H121J | 001 103 0378 9 |
| C5, C6 | ECKD1H821KB | 001 103 1596 7 |
| C7, C8 | ECQM1H273JZ | 001 106 0760 2 |
| C9, C10 | ECEA1HU2R2 | 001 120 3253 2 |
| C11, C12 | ECQM1H103JZ | 001 106 0667 8 |
| C21 | ECKR1H103ZF5 | |
| C23, C24 | ECEA1EU4R7 | 001 120 2840 3 |
| C28 | ECEA1EU4R7 | 001 120 2840 3 |
| C51, C52 | ECEA1AU331 | 001 120 3649 6 |
| C54 | ECEA1AU331 | 001 120 3649 6 |
| C55 | ECEA1CU220 | 001 120 2906 2 |
| C57, C58 | ECQV1H104JZ | 001 106 2571 7 |
| C61, C62 | ECCD1H220K | 001 103 0493 7 |
| C71, C72 | ECEA1CU100 | 001 120 2905 3 |
| C79 | ECEA1CU101 | 001 120 2926 8 |

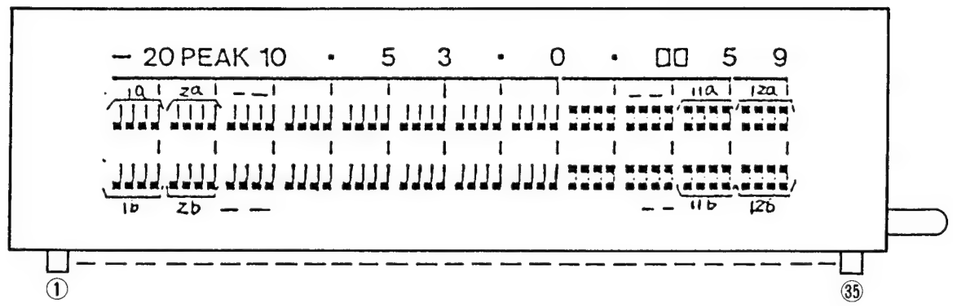
| Ref. No. | Part No. | Part Code |
|---|---|---|
| C91 | ECKD1H223PF | 001 103 1510 9 |
| C92 | ECEA1CU221 | 001 120 2833 2 |
| C101, C102 | ECEA1HUR22 | 001 120 3247 0 |
| C153, C154 | ECKD1H221KB | 001 103 1487 1 |
| C155, C156 | ECEA1HUR47 | 001 120 3249 8 |
| C157, C158 | ECQM1H223JZ | 001 106 0739 9 |
| C159, C160 | ECQM1H472JZ | 001 106 0801 0 |
| C161, C162 | ECQM1H392JZ | 001 106 0790 6 |
| C165, C166 | ECQM1H223JZ | 001 106 0739 9 |
| C169, C170 | ECQM1H183JV | |
| C173, C174 | ECEA1EU4R7 | 001 120 2840 3 |
| C175, C176 | ECBT1H561KB5 | 001 103 9079 1 |
| C177, C178 | ECCF1H121J | 001 103 0378 9 |
| C202 | ECQM1H103JZ | 001 106 0667 8 |
| C203 | ECEA1CU100 | 001 120 2905 3 |
| C204 | ECCD1H470K | 001 103 0627 1 |
| C205 | ECEA1HU010 | 001 120 2842 1 |
| C301 | ECQP1153JZW | 001 106 3505 3 |
| C302 | ECCW1H100D5 | 001 103 6137 0 |
| C303 | ECQM1H562JZ | 001 106 0820 7 |
| C304, C305 | ECQM1H472JZ | 001 106 0801 0 |
| C306 | ECQM1H472JZ | 001 106 0801 0 |
| C307 | ECEA1EU4R7 | 001 120 2840 3 |
| C315, C316 | ECKD1H223PF | 001 103 1510 9 |
| C317, C318 | ECCF1H121J | 001 103 0378 9 |
| C319, C320 | ECBT1H681KB5 | 001 103 9167 2 |
| C321, C322 | ECBT1H561KB5 | 001 103 9079 1 |
| C323, C324 | ECQM1H223JZ | 001 106 0739 9 |
| C325, C326 | ECQV1H104JZ | 001 106 2571 7 |
| C327, C328 | ECQM1H103JZ | 001 106 0667 8 |
| C330 | ECEA1CU100 | 001 120 2905 3 |
| C401, C402 ⚠ | ECKD1H152KB | 001 103 1467 5 |
| C403, C404 | ECQM1H472JZ | 001 106 0801 0 |
| C405, C406 | ECEA1CU100 | 001 120 2905 3 |
| C407, C408 | ECQM1H473JZ | 001 106 0810 9 |
| C409, C410 | ECEA1HUR22 | 001 120 3247 0 |
| C411, C412 | ECEA50ZR68 | 001 120 1290 5 |
| C413, C414 | ECQM1H103JZ | 001 106 0667 8 |
| C415, C416 | ECQM1H472JZ | 001 106 0801 0 |
| C417, C418 | ECEA1CU100 | 001 120 2905 3 |
| C419, C420 | ECQM1H473JZ | 001 106 0810 9 |

| Ref. No. | Part No. | Part Code |
|---|---|---|
| C421, C422 | ECEA1HUR22 | 001 120 3247 0 |
| C423, C424 | ECEA50ZR68 | 001 120 1290 5 |
| C429, C430 | ECCF1H121J | 001 103 0378 9 |
| C431, C432 | ECEA1EU4R7 | 001 120 2840 3 |
| C437, C438 | ECQM1H472JZ | 001 106 0801 0 |
| C451, C452 ⚠ | ECKD1H122KB | 001 103 1459 5 |
| C453, C454 | ECQM1H472JZ | 001 106 0801 0 |
| C455, C456 | ECEA1CU100 | 001 120 2905 3 |
| C457, C458 | ECQM1H473JZ | 001 106 0810 9 |
| C459, C460 | ECEA1HUR22 | 001 120 3247 0 |
| C461, C462 | ECEA50ZR68 | 001 120 1290 5 |
| C463, C464 | ECQM1H103JZ | 001 106 0667 8 |
| C465, C466 | ECQM1H472JZ | 001 106 0801 0 |
| C467, C468 | ECEA1CU100 | 001 120 2905 3 |
| C469, C470 | ECQM1H473JZ | 001 106 0810 9 |
| C471, C472 | ECEA1HUR22 | 001 120 3247 0 |
| C473, C474 | ECEA50ZR68 | 001 120 1290 5 |
| C475, C476 | ECCF1H121J | 001 103 0378 9 |
| C477 | ECEA1EU4R7 | 001 120 2840 3 |
| C481, C482 | ECEA1CU100 | 001 120 2905 3 |
| C483, C484 | ECEA1CU100 | 001 120 2905 3 |
| C487, C488 ⚠ | ECKD1H152KB | 001 103 1467 5 |
| C490 | ECEA1EU4R7 | 001 120 2840 3 |
| C601 | ECEA1CU222 | 001 120 3074 3 |
| C602 | ECEA1EU102 | 001 120 2705 9 |
| C603, C604 | ECKD1H223PF | 001 103 1510 9 |
| C605, C606 | ECEA1CU221 | 001 120 2833 2 |
| C609 ⚠ | ECEA1CU332 | 001 120 3201 4 |
| C613 ⚠ | ECKD1H152KB | 001 103 1467 5 |
| C614 | ECEA1AU101 | 001 120 2830 5 |
| C615 ⚠ | ECKDKC103PF2 | 001 103 3734 7 |
| C711, C712 | ECEA1CU330 | 001 120 2834 1 |
| C901 ⚠ | ECKD1H122KB | 001 103 1459 5 |
| C902 ⚠ | ECEA1AU101 | 001 120 2830 5 |
| C903 | ECKD1H223PF | 001 103 1510 9 |
| C904 | ECEA1EU4R7 | 001 120 2840 3 |
| C905 | ECEA1HU2R2 | 001 120 3253 2 |
| C906, C907 | ECKD1H221KB | 001 103 1487 1 |
| C908 | ECKR1H103ZF5 | |
| C911 | ECEA1CN100S | 001 120 0233 8 |
| C915 ⚠ | ECKD1H152KB | 001 103 1467 5 |



# ■ DESCRIPTION OF FL PANEL

## • SEGMENT

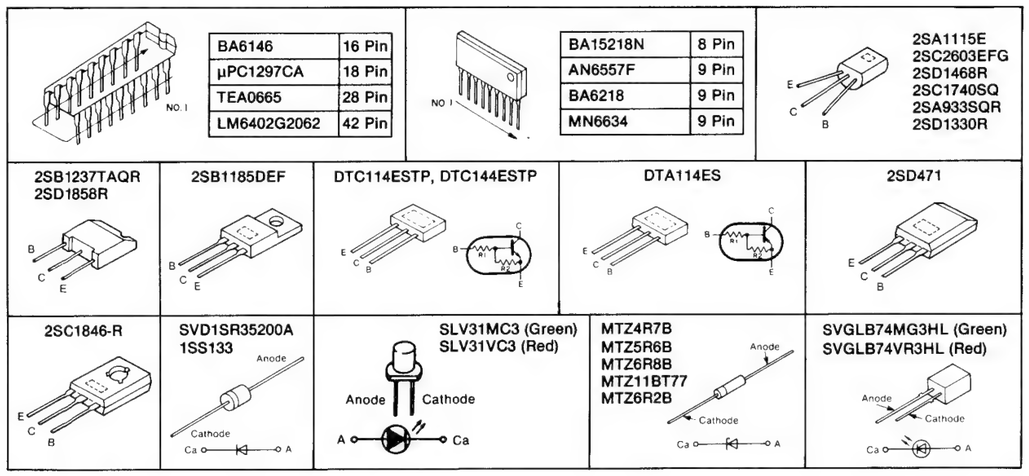



## • PIN CONNECTION

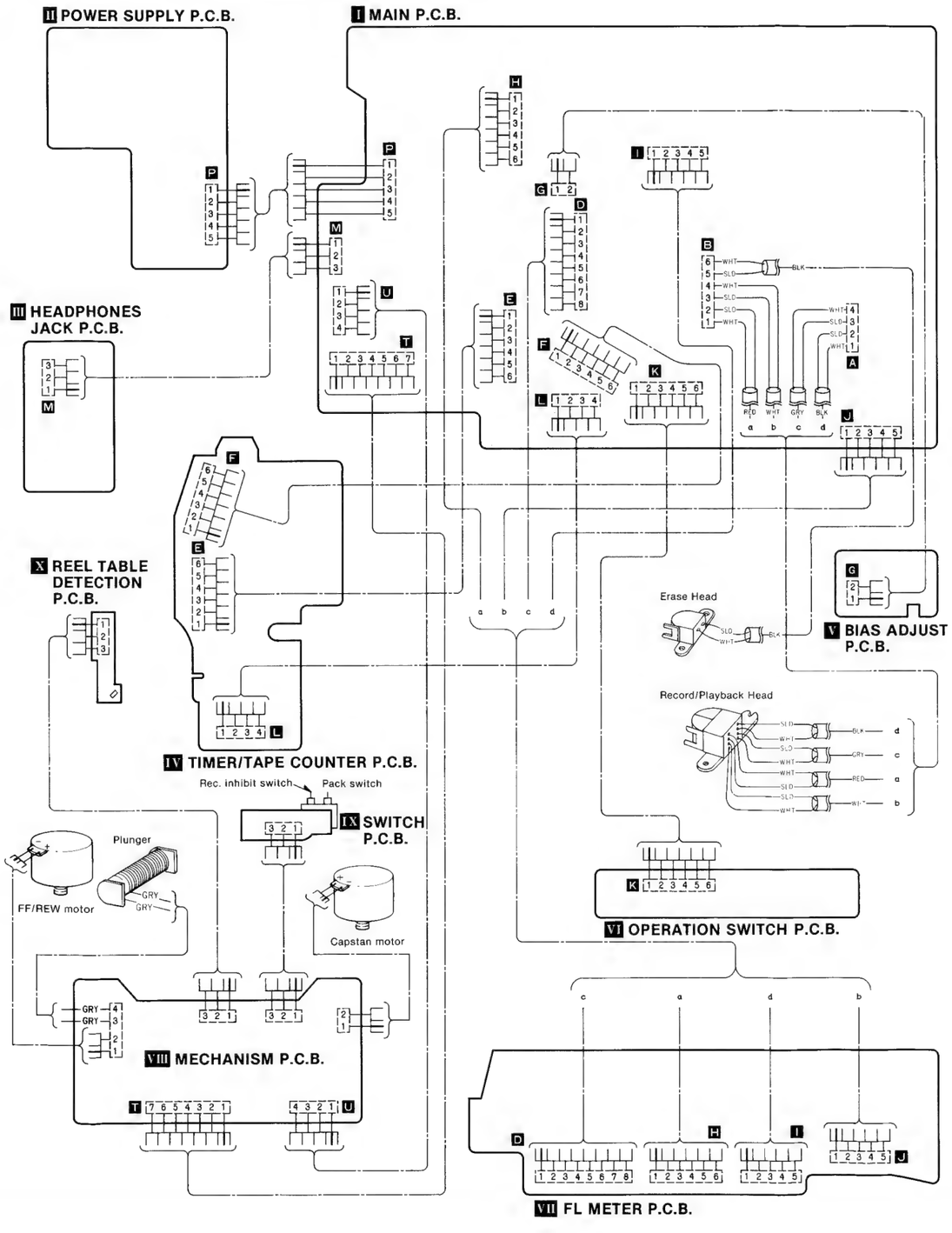
| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONNECTION | F | F | 1 b | 2 b | 3 b | 4 b | 5 b | 6 b | 7 b | 8 b | 9 b | 10 b | 11 b | 12 b | Gd | SC | N C | N C | N C | N C | 1 a | 2 a | 3 a | 4 a | 5 a | 6 a | 7 a | 8 a | 9 a | 10 a | 11 a | 12 a | N P | F | F |



# ■ TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES



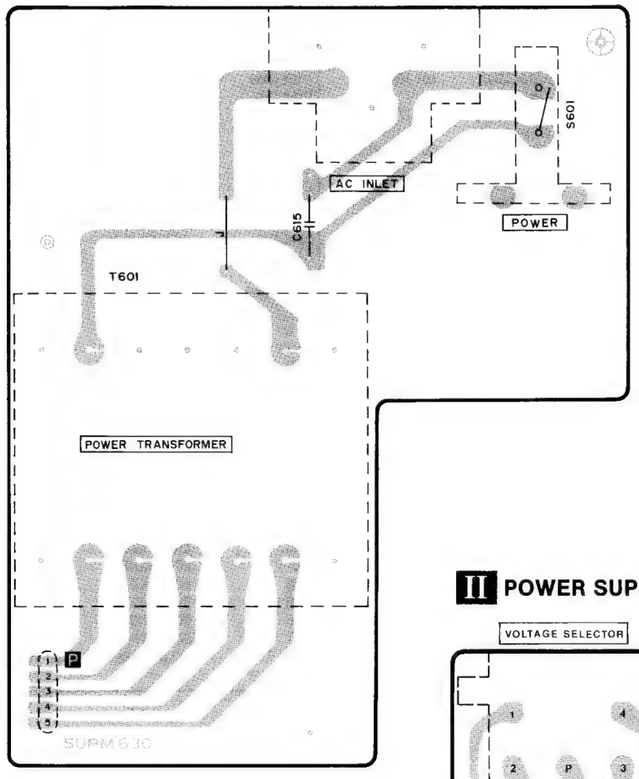
## WIRING CONNECTION DIAGRAM



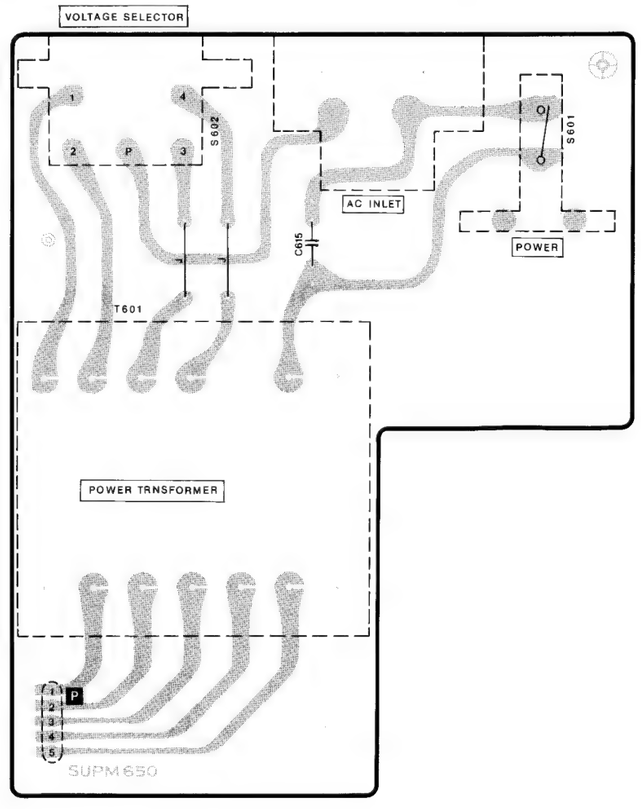



## PRINTED CIRCUIT BOARDS

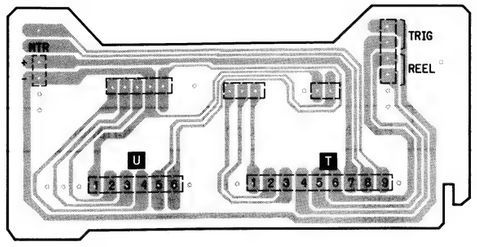
### II POWER SUPPLY P.C.B. ([E, EK, EG, EH, XL])



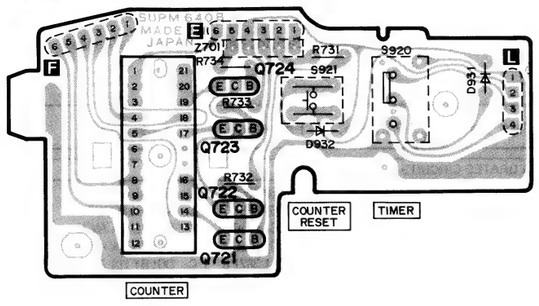

### II POWER SUPPLY P.C.B. ([XA, XB] only)



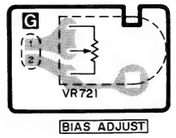
## VIII MECHANISM P.C.B.



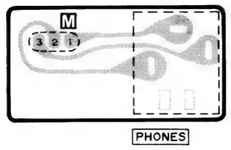

## IV TIMER/TAPE COUNTER P.C.B.



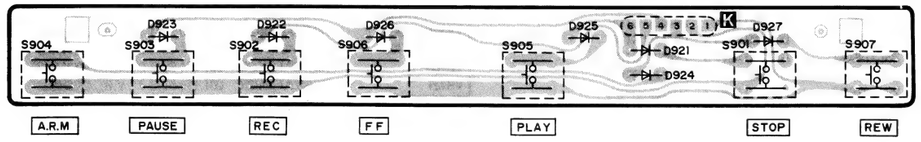

## V BIAS ADJUST P.C.B.



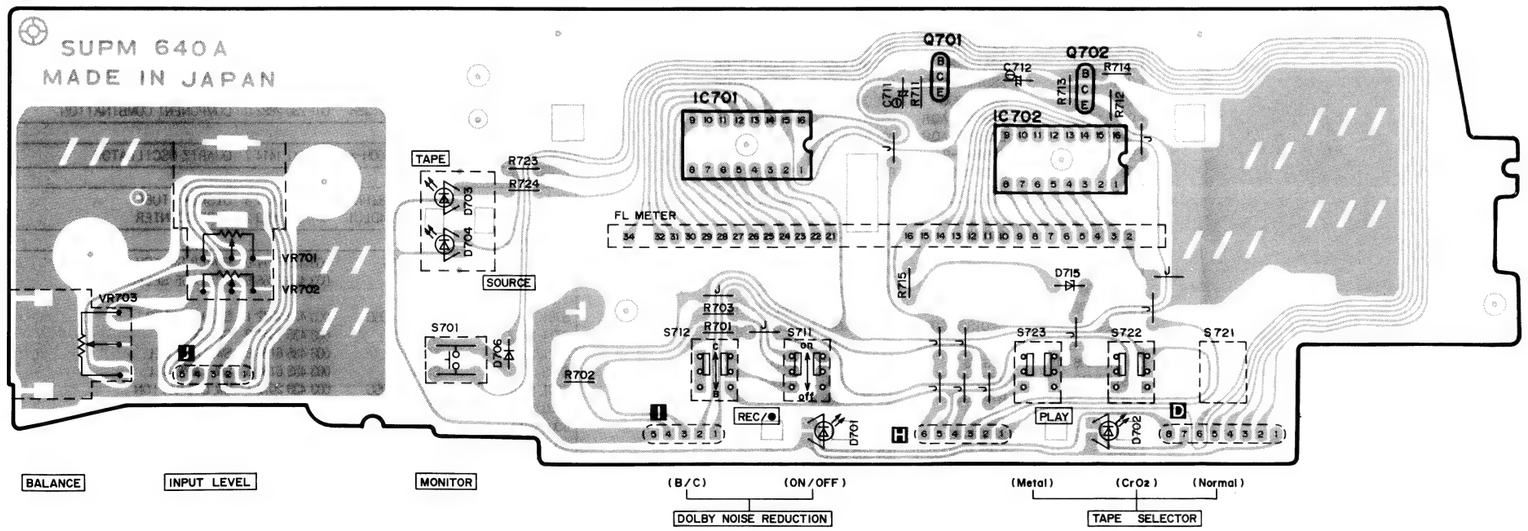

## III HEADPHONES JACK P.C.B.



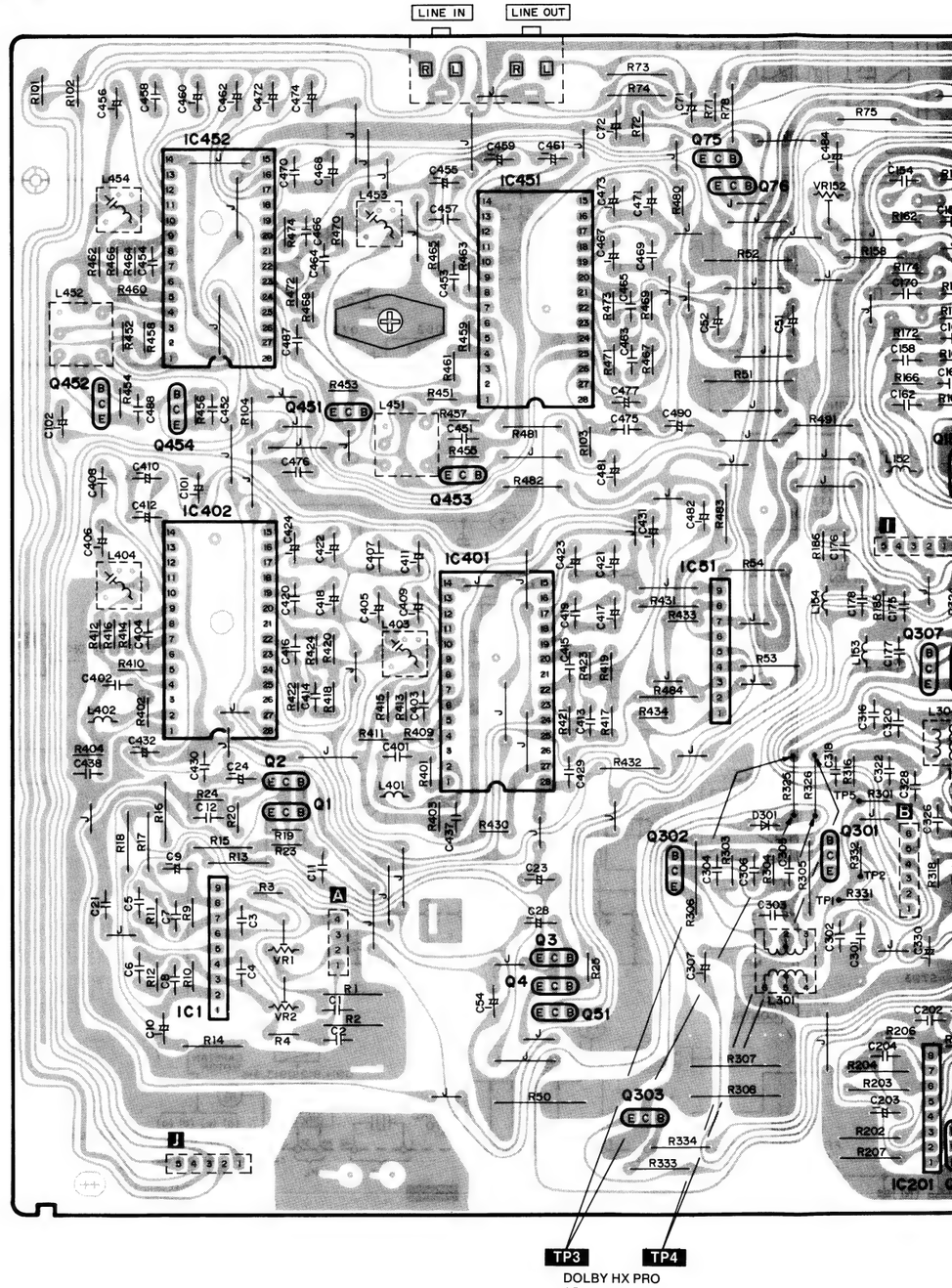

## VI OPERATION SWITCH P.C.B.



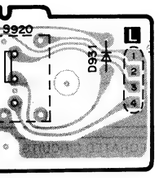

## VII FL METER P.C.B.

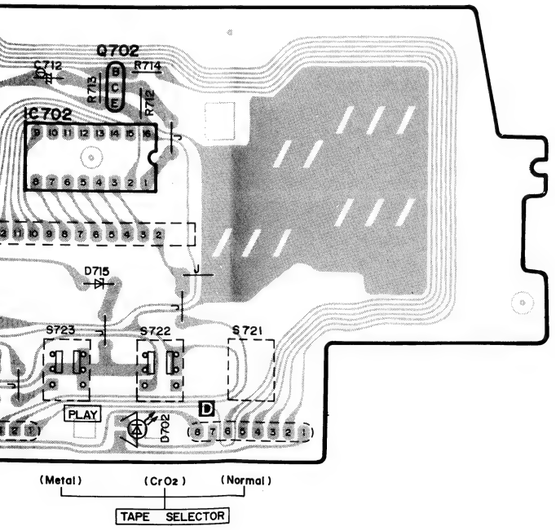



## I MAIN P.C.B.

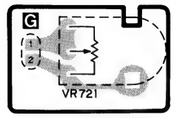


B.

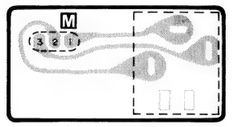


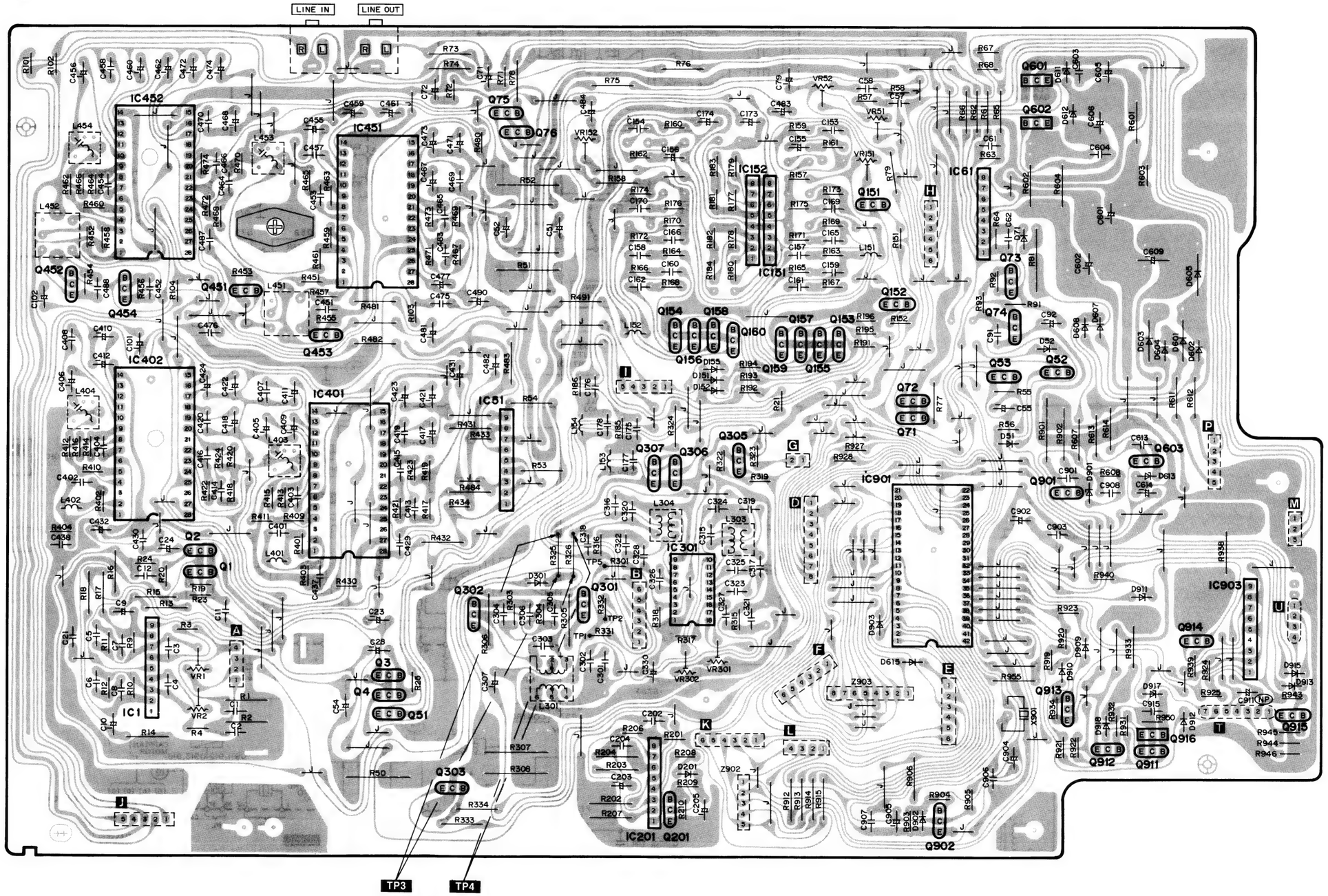

**V** BIAS ADJUST P.C.B.



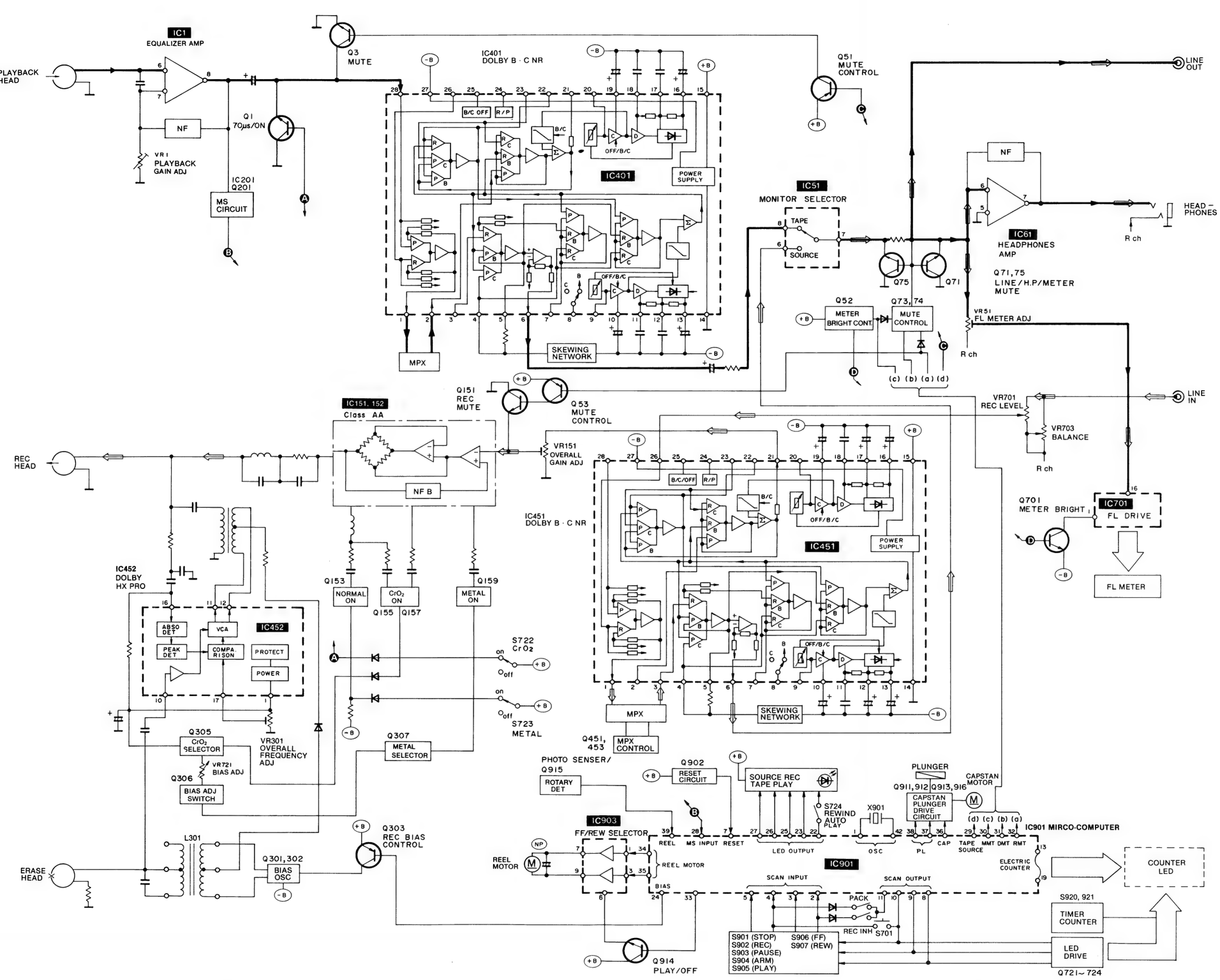

**III** HEADPHONES JACK P.C.B.




**I** MAIN P.C.B.



## ■ BLOCK DIAGRAM

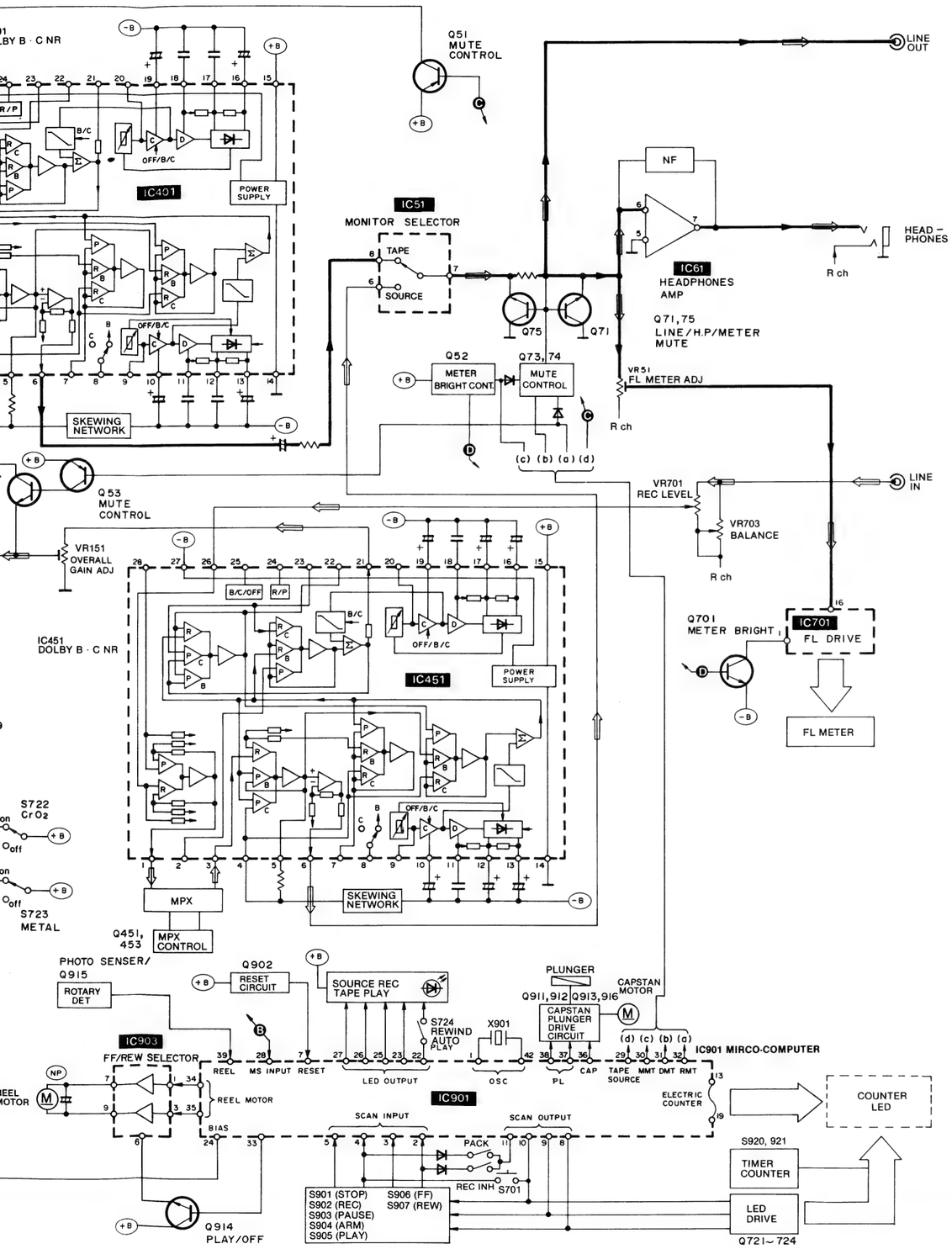





## ■ REPLACE

**Notes:** * Important sa
Components
teristics imp
these compo
parts.
* Bracketed in
area.
Parts without

| Ref. No. | Pa |
|---|---|
| INTEGRATED CIRCUITS | |
| IC1 | AN655 |
| IC51 | MN663 |
| IC61, IC151 | BA152 |
| IC152, IC201 | BA152 |
| IC301 | UPC12 |
| IC401, IC402 | TEA06 |
| IC451, IC452 | TEA06 |
| IC701, IC702 | BA614 |
| IC901 | LM640 |
| IC903 | BA621 |
| TRANSISTORS | |
| Q1, Q2 | 2SC17 |
| Q3, Q4 | 2SD14 |
| Q51, Q52 | DTA11 |
| Q53 | 2SA93 |
| Q71, Q72 | 2SC17 |
| Q73 | 2SA93 |
| Q74 | DTC11 |
| Q75, Q76 | 2SC17 |
| Q151, Q152 | 2SD14 |
| Q153, Q154 | 2SA93 |
| Q155, Q156 | 2SC17 |
| Q157, Q158 | 2SC17 |
| Q159, Q160 | 2SC17 |
| Q201 | 2SC17 |
| Q301, Q302 | 2SC26 |
| Q303 | 2SB12 |
| Q305 | DTC14 |
| Q306 | 2SC17 |
| Q307 | DTC11 |
| Q451, Q452 | 2SA93 |
| Q453, Q454 | 2SA93 |
| Q601 | 2SD17 |
| Q602 | 2SB11 |
| Q603 | 2SD47 |
| Q701, Q702 | 2SD14 |
| Q721, Q722 | 2SA11 |
| Q723, Q724 | 2SA11 |
| Q901 | 2SD18 |
| Q902 | 2SC17 |
| Q911, Q912 | 2SB12 |
| Q913 | 2SB12 |
| Q914 | 2SC18 |
| Q915 | 2SC17 |
| Q916 | 2SD17 |
| DIODES | |
| D51, D52 | 1SS13 |
| D71, D151 | 1SS13 |
| D152, D155 | 1SS13 |
| D201, D301 | 1SS13 |
| D601, D602 ⚠ | SVD1S |
| D603, D604 ⚠ | SVD1S |
| D605 ⚠ | SVD1S |
| D607, D608 ⚠ | 1SS13 |
| D611, D612 | MTZ11 |
| D613 ⚠ | MTZ6R |
| D615 | 1SS13 |
| D701, D702 | SLV31 |
| D703 | SVGLE |
| D704 | SVGLE |
| D706 | 1SS13 |






# REPLACEMENT PARTS LIST

**Notes:** * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

| Ref. No. | Part No. | Part Code | Description |
|---|---|---|---|
| **INTEGRATED CIRCUITS** | | | |
| IC1 | AN6557F | 001 060 7688 6 | I.C., EQUALIZER |
| IC51 | MN6634 | 001 061 0884 7 | I.C., NR SELECTOR |
| IC61, IC151 | BA15218N | 001 061 5316 4 | I.C., CLASS AA AMP. |
| IC152, IC201 | BA15218N | 001 061 5316 4 | I.C., CLASS AA AMP. |
| IC301 | UPC1297CA | 001 061 3671 6 | I.C., DOLBY HX PRO |
| IC401, IC402 | TEA0665 | 001 060 7933 2 | I.C., DOLBY B, C NR |
| IC451, IC452 | TEA0665 | 001 060 7933 2 | I.C., DOLBY B, C NR |
| IC701, IC702 | BA6146 | 001 060 8268 8 | I.C., FL DRIVE |
| IC901 | LM6405G-2104 | 001 061 5238 1 | I.C., MICROCOMPUTER |
| IC903 | BA6218 | 001 061 1421 0 | I.C., MOTOR DRIVE |
| **TRANSISTORS** | | | |
| Q1, Q2 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q3, Q4 | 2SD1450R | 001 030 4366 1 | TRANSISTOR |
| Q51, Q52 | DTA114ESTP | 001 030 5275 9 | TRANSISTOR |
| Q53 | 2SA933SQR | 001 030 5081 7 | TRANSISTOR |
| Q71, Q72 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q73 | 2SA933SQR | 001 030 5081 7 | TRANSISTOR |
| Q74 | DTC114ESTP | 001 030 5025 5 | TRANSISTOR |
| Q75, Q76 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q151, Q152 | 2SD1450R | 001 030 4366 1 | TRANSISTOR |
| Q153, Q154 | 2SA933SQR | 001 030 5081 7 | TRANSISTOR |
| Q155, Q156 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q157, Q158 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q159, Q160 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q201 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q301, Q302 | 2SC2603EFG | 001 030 4301 8 | TRANSISTOR |
| Q303 | 2SB1237TAQR | 001 030 6929 0 | TRANSISTOR |
| Q305 | DTC144A | 001 030 2708 7 | TRANSISTOR |
| Q306 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q307 | DTC114ESTP | 001 030 5025 5 | TRANSISTOR |
| Q451, Q452 | 2SA933SQR | 001 030 5081 7 | TRANSISTOR |
| Q453, Q454 | 2SA933SQR | 001 030 5081 7 | TRANSISTOR |
| Q601 | 2SD1762DE | 001 030 6930 7 | TRANSISTOR |
| Q602 | 2SB1185DEF | 001 030 5691 7 | TRANSISTOR |
| Q603 | 2SD471 | 001 030 1730 3 | TRANSISTOR |
| Q701, Q702 | 2SD1468R | 001 030 2894 0 | TRANSISTOR |
| Q721, Q722 | 2SA1115E | 001 030 2451 3 | TRANSISTOR |
| Q723, Q724 | 2SA1115E | 001 030 2451 3 | TRANSISTOR |
| Q901 | 2SD1858TAQR | 001 030 6931 6 | TRANSISTOR |
| Q902 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q911, Q912 | 2SB1237TAQR | 001 030 6929 0 | TRANSISTOR |
| Q913 | 2SB1237TAQR | 001 030 6929 0 | TRANSISTOR |
| Q914 | 2SC1846-R | 001 030 1134 7 | TRANSISTOR |
| Q915 | 2SC1740SQ | 001 030 4871 9 | TRANSISTOR |
| Q916 | 2SD1762DE | 001 030 6930 7 | TRANSISTOR |
| **DIODES** | | | |
| D51, D52 | 1SS133 | 001 032 3324 5 | DIODE |
| D71, D151 | 1SS133 | 001 032 3324 5 | DIODE |
| D152, D155 | 1SS133 | 001 032 3324 5 | DIODE |
| D201, D301 | 1SS133 | 001 032 3324 5 | DIODE |
| D601, D602 ⚠ | SVD1SR35200A | 001 032 3951 4 | RECTIFIER |
| D603, D604 ⚠ | SVD1SR35200A | 001 032 3951 4 | RECTIFIER |
| D605 ⚠ | SVD1SR35200A | 001 032 3951 4 | RECTIFIER |
| D607, D608 ⚠ | 1SS133 | 001 032 3324 5 | DIODE |
| D611, D612 | MTZ11BT77 | 001 032 7873 5 | DIODE |
| D613 ⚠ | MTZ6R8B | 001 032 4068 8 | DIODE |
| D615 | 1SS133 | 001 032 3324 5 | DIODE |
| D701, D702 | SLV31VC3 | 001 032 4525 4 | L.E.D |
| D703 | SVGLB74HG3HL | 001 033 0218 3 | L.E.D |
| D704 | SVGLB74VR3HL | 001 032 9300 9 | L.E.D |
| D706 | 1SS133 | 001 032 3324 5 | DIODE |
| D715 | MTZ4R7BT77 | 001 032 9439 1 | DIODE |
| D901 ⚠ | MTZ5R6B | 001 032 9506 7 | DIODE |
| D902, D909 | 1SS133 | 001 032 3324 5 | DIODE |
| D910 | 1SS133 | 001 032 3324 5 | DIODE |
| D911 ⚠ | MTZ5R6B | 001 032 9506 7 | DIODE |
| D912, D913 | 1SS133 | 001 032 3324 5 | DIODE |
| D915 | 1SS133 | 001 032 3324 5 | DIODE |
| D917 | MTZ8R2B | 001 032 4210 0 | DIODE |
| D918 ⚠ | SVD1SR35200A | 001 032 3951 4 | RECTIFIER |
| D921, D922 | 1SS133 | 001 032 3324 5 | DIODE |
| D923, D924 | 1SS133 | 001 032 3324 5 | DIODE |
| D925, D926 | 1SS133 | 001 032 3324 5 | DIODE |
| D927, D931 | 1SS133 | 001 032 3324 5 | DIODE |
| D932 | 1SS133 | 001 032 3324 5 | DIODE |
| **VARIABLE RESISTORS** | | | |
| VR1, VR2 | QVNB3A00B331 | 001 180 1595 5 | V.R., 330Ω(B) |
| VR51, VR52 | EVND4AA00B24 | 001 180 2244 1 | V.R., 20KΩ(B) |
| VR151, VR152 | QVNB3A00B103 | 001 180 1684 5 | V.R., 10KΩ(B) |
| VR301, VR302 | EVND4AA00B24 | 001 180 2244 1 | V.R., 20KΩ(B) |
| VR701, VR702 | EWK94A033A54 | 001 174 8883 8 | V.R., 50KΩ(A) |
| VR703 | EWHFDAF20G25 | 001 174 8947 9 | V.R., 200KΩ(G) |
| VR721 | EVJMLAF20B23 | 001 174 9173 7 | V.R., 2KΩ(B) |
| **COILS AND TRANSFORMERS** | | | |
| L151, L152 | SLQX272-1YT | 001 211 0649 2 | CHOKE COIL |
| L153, L154 | SLQX303-1K | 001 211 1756 6 | CHOKE COIL |
| L301 | QLB0202 | 001 210 9090 8 | COIL |
| L303, L304 | SL09B1-K | 001 211 3508 2 | OSCILLATOR COIL |
| L401, L402 | SLQX272-1YT | 001 211 0649 2 | CHOKE COIL |
| L403, L404 | SLM1B8-K | 001 211 2731 1 | MPX COIL |
| L451, L452 | QLB40048 | 001 210 7275 9 | COIL |
| L453, L454 | SLM1B8-K | 001 211 2731 1 | MPX COIL |
| T601 ⚠ (E, EG, EH) | SLT5L277-W | 001 202 9018 2 | POWER TRANSFORMER |
| T601 ⚠ (EK, XL) | SLT5L278-W | 001 202 9019 1 | POWER TRANSFORMER |
| T601 ⚠ (XA, XB) | SLT5L283-W | 001 202 9020 8 | POWER TRANSFORMER |
| **COMPONENT COMBINATIONS** | | | |
| Z701 | EXBF5E103J8R | 001 230 2886 6 | COMPONENT COMBINATION |
| Z902 | EXBF5E472J8R | 001 230 2223 9 | COMPONENT COMBINATION |
| Z903 | EXBF8E471J8R | 001 230 2882 0 | COMPONENT COMBINATION |
| **OSCILLATORS** | | | |
| X901 | SVFKBR800H-K | 001 241 1414 7 | QUARTZ OSCILLATOR |
| **DISPLAYS** | | | |
| FL1 | SADBG368ZRK | 001 001 0517 3 | DISPLAY TUBE |
| SVG1 | SVGLC204DLU1 | 001 033 0219 2 | TAPE COUNTER |
| **SWITCHES** | | | |
| S601 ⚠ | ESB8249V | 003 435 5877 0 | POWER SWITCH |
| S602 ⚠ (XA, XB) | SSR227 | 003 430 2365 6 | VOLTAGE SELECTOR |
| S701 | EVQQAC05G | 003 439 2072 1 | SW, MONITOR |
| S711, S712 | SSH2121 | 003 435 5841 2 | SW, DOLBY |
| S721, S722 | SSH3707 | 003 435 6136 6 | SW, TAPE SEL. |
| S723 | SSH3707 | 003 435 6136 6 | SW, TAPE SEL. |
| S901, S902 | EVQQAC05G | 003 439 2072 1 | SW, OPERATION |
| S903, S904 | EVQQAC05G | 003 439 2072 1 | SW, OPERATION |
| S905, S906 | EVQQAC05G | 003 439 2072 1 | SW, OPERATION |
| S907 | EVQQAC05G | 003 439 2072 1 | SW, OPERATION |
| S920 | QSS1306 | 003 431 2419 4 | SW, TIMER |
| S921 | EVQQAC05G | 003 439 2072 1 | SW, COUNTER RESET |
| S1001, S1002 | SMQA1058 | 003 435 6131 1 | SW, PACK/REC INH. |

# REPLACEMENT PARTS LIST

**Notes:** * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

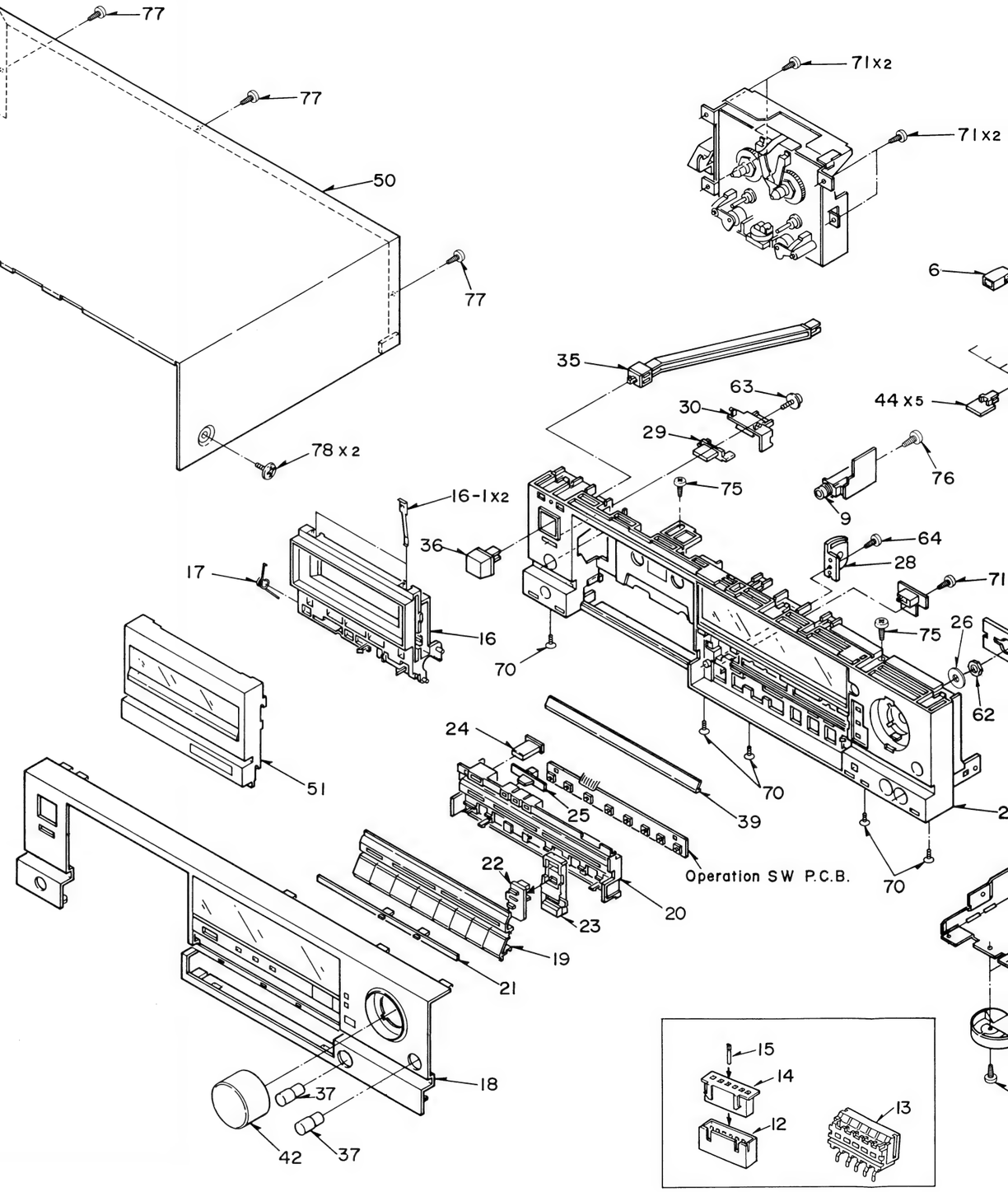
* "Ⓢ" mark parts are used for silver type only.
* "Ⓚ" mark parts are used for black type only.
Parts other than "Ⓢ" and "Ⓚ" marked are used for both silver and black types.

| Ref. No. | | Part No. | Part Code | Description |
|---|---|---|---|---|
| CABINET AND CHASSIS | | | | |
| 1 | ⚠ | SJSD16 | 003 400 7436 6 | AC INLET |
| (XL) | | | | |
| 1 | ⚠ | SJS9236 | 003 403 4660 7 | AC INLET |
| (E, EG, EK, EH) | | | | |
| (XA, XB) | | | | |
| 2 | | SMX897 | 016 600 0483 0 | SHIELD COVER |
| 3 | | SMNM11 | 016 632 1852 3 | BRACKET |
| 4 | | SHRM9022 | 016 652 0828 5 | COUNTER HOLDER |
| 5 | | SHRM9021 | 016 652 0827 6 | METER HOLDER |
| 6 | | SMPSB905-KE | | L.E.D. BLOCK |
| 7 | | SHRM9023 | 016 652 0829 4 | L.E.D. HOLDER |
| 8 | | SMNM14 | 016 632 1916 4 | BRACKET |
| 9 | | QJA0455ZC | 003 400 5218 2 | HEADPHONES JACK |
| 11 | | SJF3057N | 003 410 3829 3 | TERMINAL BOARD |
| 12 | | SJT3415 | 003 403 3909 5 | CONNECTOR(4-P) |
| 12 | | SJT3611 | 003 410 6000 8 | CONNECTOR(6-P) |
| 13 | | SJT30243-V | 003 410 6222 6 | CONNECTOR(2-P) |
| 13 | | SJT30340LX-V | 003 410 6075 9 | CONNECTOR(3-P) |
| 13 | | SJT30440LX-V | 003 410 6076 8 | CONNECTOR(4-P) |
| 13 | | SJT30540LX-V | 003 410 5996 1 | CONNECTOR(5-P) |
| 13 | | SJT30640LX-V | 003 410 6149 8 | CONNECTOR(6-P) |
| 13 | | SJT30840LX-V | 003 410 5998 9 | CONNECTOR(8-P) |
| 14 | | SJS5421 | 003 400 1643 5 | CONNECTOR(4-P) |
| 14 | | SJS5629 | 003 400 5917 2 | CONNECTOR(6-P) |
| 15 | | SJT783 | 003 410 6001 7 | CONTACT |
| 16 | | SGXSB80R-KAN | 016 846 3666 5 | CASSETTE HOLDER |
| 16-1 | | QBP2006A | 015 727 0706 8 | SPRING |
| 17 | | SUSM12 | 016 726 0913 0 | SPRING |
| 18 | Ⓚ | SGWSB705-KE | 016 840 7716 6 | FRONT PANEL |
| 18 | Ⓢ | SGWSB705-SE | 016 840 7715 7 | FRONT PANEL |
| 19 | Ⓚ | SBCM90 | 016 702 7072 0 | BUTTON, OPERATION |
| 19 | Ⓢ | SBCM90-2 | 016 702 7071 1 | BUTTON, OPERATION |
| 20 | Ⓢ | SHRSB705-SE | 016 652 0877 6 | BUTTON GUIDE |
| 20 | Ⓚ | SHRSB905-KM | 016 652 0876 7 | BUTTON GUIDE |
| 21 | | SGUM31ZT1A | 016 842 1651 0 | INDICATOR |
| 22 | | SGUM32ZT0A | 016 842 1652 9 | INDICATOR |
| 23 | Ⓢ | SBCM80MA0A | 016 702 7104 9 | BUTTON, MONITOR |
| 23 | Ⓚ | SBCM80ZK0A | 016 702 7105 8 | BUTTON, MONITOR |
| 24 | Ⓢ | SBCM20MA0A | 016 702 7103 0 | BUTTON, RESET |
| 24 | Ⓚ | SBCM20ZK0A | 016 702 6902 1 | BUTTON, RESET |
| 25 | Ⓢ | SBDM20MA0A | 016 700 1998 7 | KNOB, TIMER |
| 25 | Ⓚ | SBDM20ZK0A | 016 700 1950 3 | KNOB, TIMER |
| 26 | | SHWM60H70 | 016 643 1084 8 | SPACER |
| 27 | Ⓚ | SGYSB705-KE | 016 840 7718 4 | FRONT GRILLE |
| 27 | Ⓢ | SGYSB705-SE | 016 840 7717 5 | FRONT GRILLE |
| 28 | | QYF0627A | 015 641 0945 0 | DAMPER GEAR |
| 29 | Ⓢ | SBCM50MA0A | 016 702 7101 2 | BUTTON, EJECT |
| 29 | Ⓚ | SBCM50ZK0A | 016 702 6899 9 | BUTTON, EJECT |
| 30 | | SMQM30016 | 016 718 3366 9 | LEVER |
| 35 | | SUBM14 | 016 712 0347 4 | ROD |
| 36 | Ⓢ | SBC666 | 016 702 5545 6 | BUTTON, POWER |
| 36 | Ⓚ | SBC666-5 | 016 702 6679 9 | BUTTON, POWER |
| 37 | Ⓢ | SBDM10MA0A | 016 700 1997 8 | KNOB |
| 37 | Ⓚ | SBDM10ZK0A | 016 700 1952 1 | KNOB |
| 39 | | SGXM46 | 016 846 3664 7 | ORNAMENT |
| 40 | | SGPM10ZF1A | 016 840 7713 9 | CHASSIS |
| (E) | | | | |
| 40 | | SGPM10ZF2B | 016 840 7714 8 | CHASSIS |
| (XA, XB) | | | | |
| 40 | | SGPSB705-KE | 016 840 7720 0 | CHASSIS |
| (EG, EH) | | | | |
| 40 | | SGPSB705-KK | 016 840 7719 3 | CHASSIS |
| (EK) | | | | |
| 40 | | SGPSB705-KX | 016 840 7721 9 | CHASSIS |
| (XL) | | | | |
| 41 | | SKLD5 | 016 828 0321 1 | INSULATOR |
| 42 | Ⓚ | SYTM10ZC0A | 016 700 1989 8 | DIAL, REC LEVEL |
| 42 | Ⓢ | SYTM10ZS0A | 016 700 1990 5 | DIAL, REC LEVEL |
| 43 | | SMNM10-1 | 016 632 1915 5 | COVER |
| 44 | Ⓢ | SBCM30MA0A | 016 702 7102 1 | BUTTON |
| 44 | Ⓚ | SBCM30ZK0A | 016 702 6901 2 | BUTTON |
| 45 | | SMNM15 | 016 632 1917 3 | BRACKET |
| (XA, XB) | | | | |
| 50 | Ⓚ | SKC1850K99 | 016 800 2510 2 | CABINET |
| 50 | Ⓢ | SKC1850S98 | 016 800 2608 3 | CABINET |
| 51 | Ⓚ | SYKM37 | 016 820 0608 9 | CASSETTE LID |
| 51 | Ⓢ | SYKM42 | 016 820 0609 8 | CASSETTE LID |
| SCREWS, WASHERS & NUTS | | | | |
| 61 | | XNS8FZ | 005 507 0573 8 | NUT |
| 62 | | XNS7 | 005 507 1202 8 | NUT |
| 63 | | SFXGQ06N01 | 005 500 4983 3 | SCREW |
| 64 | | XTV3+10BFN | 005 501 0818 6 | SCREW |
| 67 | | XTV3+6FR | 005 501 1321 2 | SCREW |
| 68 | | XTB3+8JFZ | 005 501 0138 3 | SCREW |
| 69 | | XTB3+12JFZ | 005 501 2078 0 | SCREW |
| (XA, XB) | | | | |
| 70 | | XTS3+8JFZ | 005 501 2270 2 | SCREW |
| 71 | | XTV3+10JR | 005 501 1142 3 | SCREW |
| 72 | | XTBS3+8JFZ1 | 005 501 2523 0 | SCREW |
| 75 | | XTB3+6JR | 005 501 4755 8 | SCREW |
| 76 | | SFXGQ06N01 | 005 500 4983 3 | SCREW |
| 77 | | XTB3+8JFZ | 005 501 0138 3 | SCREW |
| 78 | Ⓢ | SNE2118 | 005 500 5011 2 | SCREW |
| 78 | Ⓚ | SNE2118-1 | 005 500 5004 1 | SCREW |
| 79 | | XTS3+12JR | | SCREW |

| Ref. No. | | Part No. | Part Code | Description |
|---|---|---|---|---|
| PACKINGS | | | | |
| P1 | Ⓚ | SPGM100 | 016 971 5040 5 | CARTON BOX |
| (XA, XB) | | | | |
| P1 | Ⓢ | SPGM102 | 016 971 5037 0 | CARTON BOX |
| (XA, XB) | | | | |
| P1 | Ⓢ | SPGM103 | 016 971 5038 9 | CARTON BOX |
| (E, EG, EK, EH) | | | | |
| (XL) | | | | |
| P1 | Ⓚ | SPGM92 | 016 971 5039 8 | CARTON BOX |
| (E, EG, EK, EH) | | | | |
| (XL) | | | | |
| P2 | | SPSM17 | 016 977 3179 5 | PAD |
| P3 | | SPSM18 | 016 977 3178 6 | PAD |
| P4 | | XZB40X60A02 | 016 978 0254 8 | PROTECTION COVER |
| ACCESSORIES | | | | |
| A1 | | SJP2264 | 003 492 5035 3 | OUTPUT CORD |
| A2 | ⚠ | SFDAC05E03 | 003 490 4809 5 | POWER CORD |
| (E, EG, EH) | | | | |
| A2 | ⚠ | SFDAC05G02 | 003 490 2613 3 | POWER CORD |
| (EK) | | | | |
| A2 | ⚠ | SJA168-1 | 003 490 4122 9 | POWER CORD |
| (XA) | | | | |
| A2 | ⚠ | SJA173 | 003 490 4161 2 | POWER CORD |
| (XL) | | | | |
| A2 | ⚠ | SJA183 | 003 490 4873 7 | POWER CORD |
| (XB) | | | | |
| A3 | ⚠ | SJP9215 | 003 402 1437 9 | AC PLUG ADAPTOR |
| (XA, XB) | | | | |
| A4 | | SQFM65-2 | 016 983 5394 6 | INSTRUCTION MANUAL |
| (E, EH, XA, EK) | | | | |
| (XL) | | | | |
| A4 | | SQFM64 | 016 983 5196 0 | INSTRUCTION MANUAL |
| (EG) | | | | |
| A4 | | SQFM73-2 | 016 983 5390 0 | INSTRUCTION MANUAL |
| (XB) | | | | |



# CABINET PARTS LOCATION



ed for

| escription |
|---|
| . EJECT |
| . POWER |
| . POWER |
| NT |
| S |
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| S |
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| TOR |
| EC LEVEL |
| EC LEVEL |
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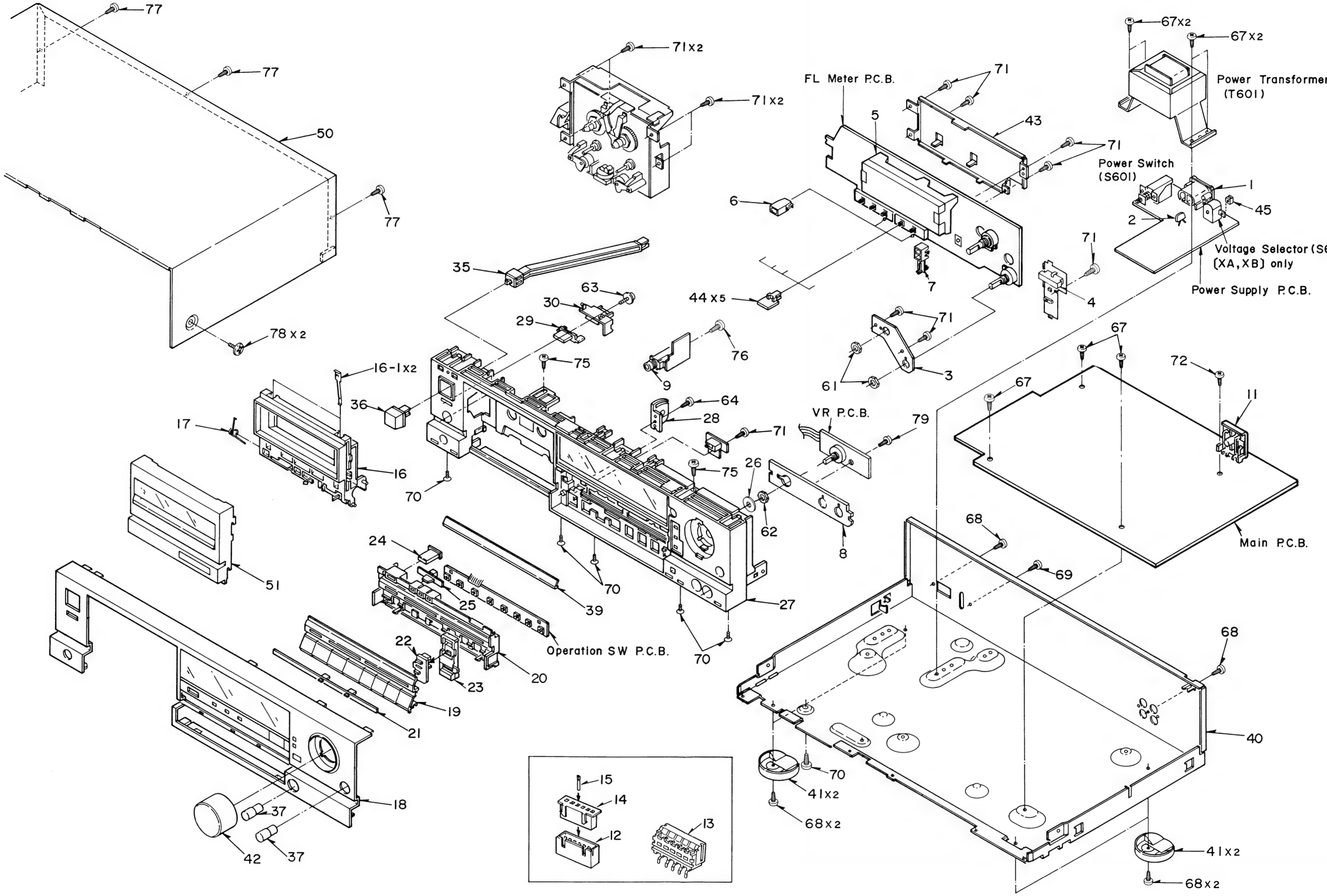
| T |
| T |
| TE LID |
| TE LID |

| escription |
|---|
| ORD |
| ORD |
| ORD |
| ORD |
| ADAPTOR |
| CTION MANUAL |
| CTION MANUAL |
| CTION MANUAL |

## ■ CABINET PARTS LOCATION



# I MAIN CIRCUIT

IC1
AN6557F
EQUALIZER

IC401, 402
TEA0665
DOLBY B·C NR

IC51
MN6634
MONITOR SELECTOR

IC451
IC 451, 452
TEA0665
DOLBY B·C NR

Q1,2
2SC1740SQ
70μs/ON

Q3,4
2SD1450TA
P.B MUTE

Q51
DTA114ESTP
MUTE CONTROL

Q71,72,75,76
2SC1740SQ
LINE / H.P. / METER MUTE

IC 61
BA15218N
HEADPHONES AMP

Q451, 452, 453, 454
2SA933SQR
DOLBY IN / ON

Q52
DTA114ESP
METER BRIGHT CONTROL

Q53,73
2SA933SQR
MUTE CONTROL

Q74
DTC114ESP
MUTE CONTROL

IC301
μPC1297CA
DOLBY HX PRO

IC201
BA15218N
MS AMP

Q201
2SC1740SQ
MS AMP

Q303
2SB1237TAQR
REC / ON

Q305
DTC144ESTP
CrO2 / ON

Q307
DTC114ESTP
METAL / ON

Q306
2SC1740SQ
Normal·CrO2 / ON

Q301,302
2SC2603EFG
BIAS OSC

IC151, 152
BA15218N
Class AA AMP

Q151, 0151, 152
2SD1450TA
REC MUTE

Q154
2SA933SQR
NORMAL ON

Q156, 158, Q160
2SC1740SQ
CrO2 ON / METAL ON

Q159
2SC1740SQ
METAL ON

Q155, 157
2SC1740SQ
CrO2 ON

Q153
2SA933SQR
NORMAL ON

Q901
2SD1858TAQR
REGULATOR

Q601
2SD1762DE
REGULATOR

Q602
2SB1185DEF
REGULATOR

PLAYBACK HEAD

REC HEAD

ERASE HEAD

PLAYBACK GAIN ADJ.

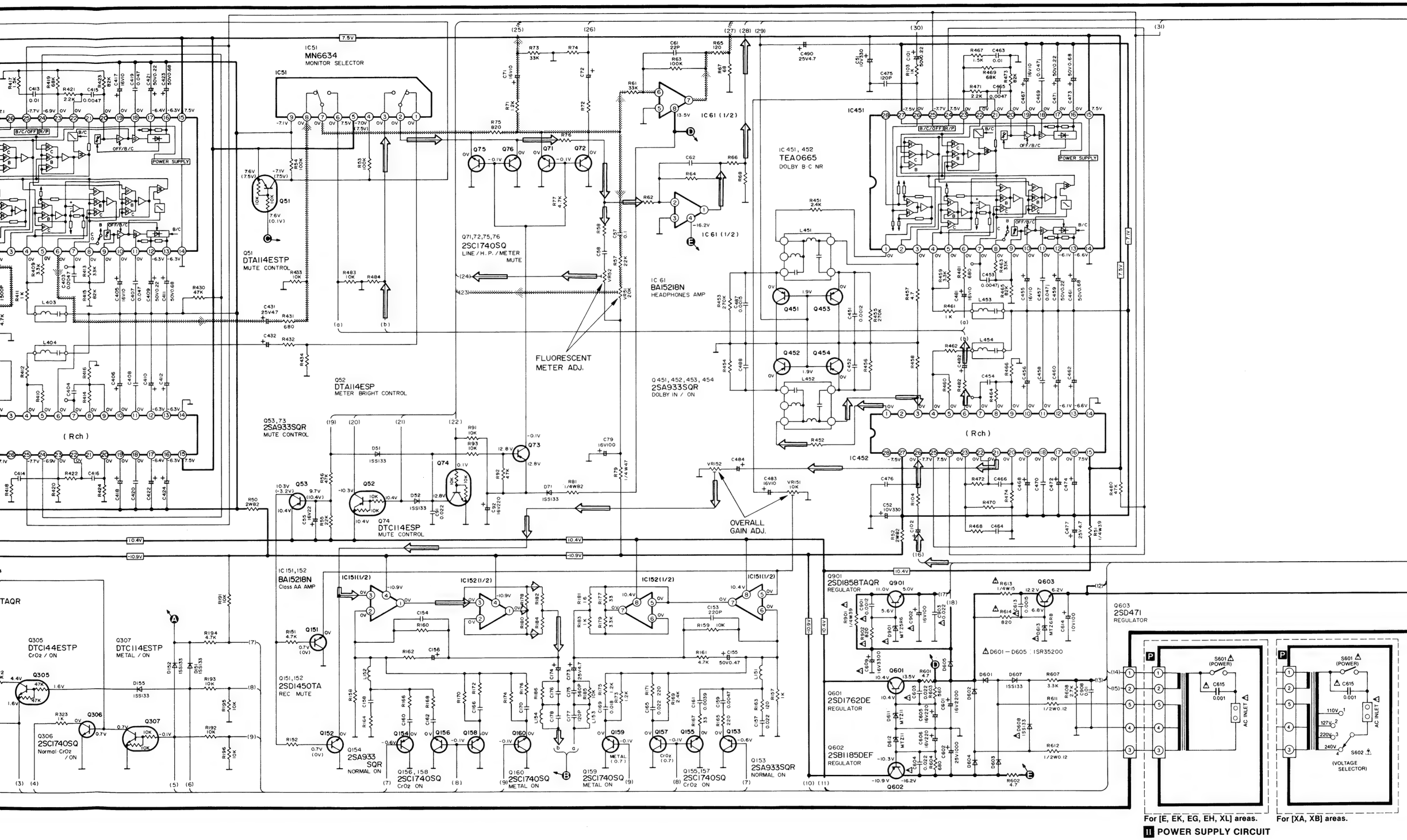
DOLBY HX PRO ADJ.

DOLBY HX PRO ADJ. (Lch)

OVERALL FREQUENCY RESPONSE

FLUORESCENT METER ADJ.

OVERALL GAIN ADJ.




**II POWER SUPPLY CIRCUIT**

III HEADPHONES JACK CIRCUIT

VII FL METER CIRCUIT

IC901
LM6405G-2104
MICRO-COMPUTER

Q902
2SC1740SQ
RESET

Q916
2SD1762DE
REGULATOR

Q911, 912, 913
2SB1237TAQR
MOTOR, PLUNGER

Q915
2SC1740SQ
ROTAY DETECTION

IC903
BA6218
FF/REW SELECTOR

Q914
2SC1846-R
PLAY / OFF

Q701, 702
2SD1468R
METER BRIGHT

IC701, 702
BA6146
FL DRIVE

FL1 SADBG368ZRK

INPUT BALANCE CONTROL

INPUT LEVEL CONTROL

VIII MECHANISM CIRCUIT

Reel Pulse

Reel Motor

Trigger Solenoid

Capstan Motor

REC INH SW

PACK SW

VI OPERATION SWITCH CIRCUIT

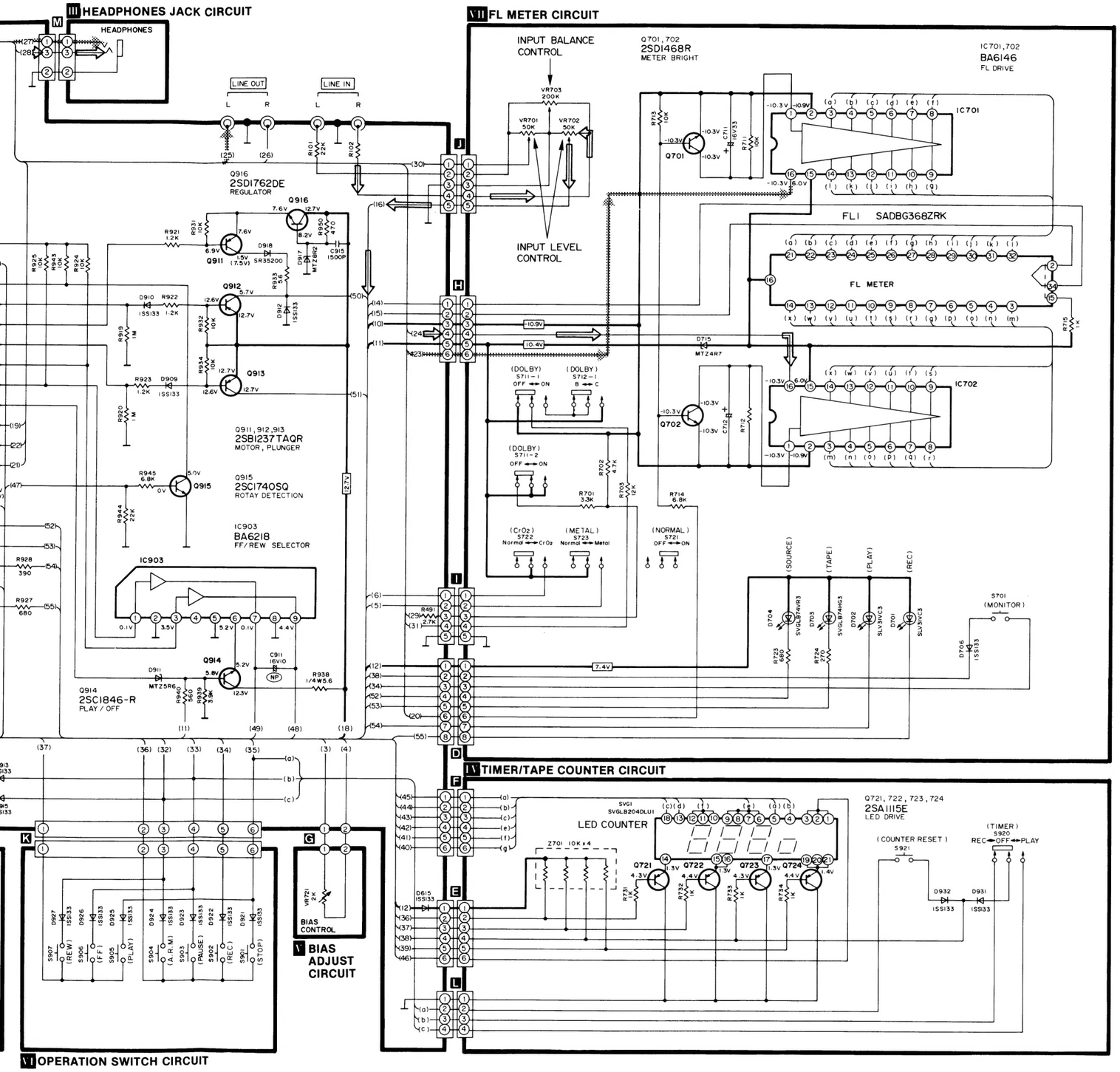
V BIAS ADJUST CIRCUIT

BIAS CONTROL

IV TIMER/TAPE COUNTER CIRCUIT

Q721, 722, 723, 724
2SA1115E
LED DRIVE

LED COUNTER






# ■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

**Notes:**

- **S601** : Power switch in "**off**" position.
- **S602** : Voltage selector in "**240V**" position ([XA, XB] area only).
- **S701** : Monitor switch.
- **S711** : Dolby NR switch in "**off**" position.
- **S712** : Dolby NR B/C selector in "**B**" position.
- **S721** : I/Normal tape selector in "**on**" position.
- **S722** : II/$CrO_2$ tape selector in "**off**" position.
- **S723** : IV/Metal tape selector in "**off**" position.
- **S901** : Stop switch in "**off**" position.
- **S902** : Rec. switch in "**off**" position.
- **S903** : Pause switch in "**off**" position.
- **S904** : Auto rec. mute in "**off**" position.
- **S905** : Play switch in "**off**" position.
- **S906** : FF (MS) switch in "**off**" position.
- **S907** : Rew (MS) switch in "**off**" position.
- **S920** : Timer stand-by switch in "**rec**" position.
- **S921** : Counter reset switch in "**off**" position.
- **S1001** : Pack switch in "**off**" position.
- **S1002** : Rec inhibit switch in "**off**" position.

- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
  1K=1,000 (Ω), 1M=1,000k (Ω)
- Capacity are in micro-farads (μF) unless specified otherwise.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
  ( )...Voltage values at record mode.
- (—▭—) indicates B (bias).
- (⋯⋯) indicates the flow of the playback signal.
- (⟹) indicates the flow of the record signal.
- Important safety notice
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

## ∗ Caution!

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

∗Cover the parts boxes made of plastics with aluminum foil.
∗Ground the soldering iron.
∗Put a conductive mat on the work table.
∗Do not touch the legs of IC or LSI with the fingers directly.

**SPECIFICATIONS** ∗Input level control...MAX

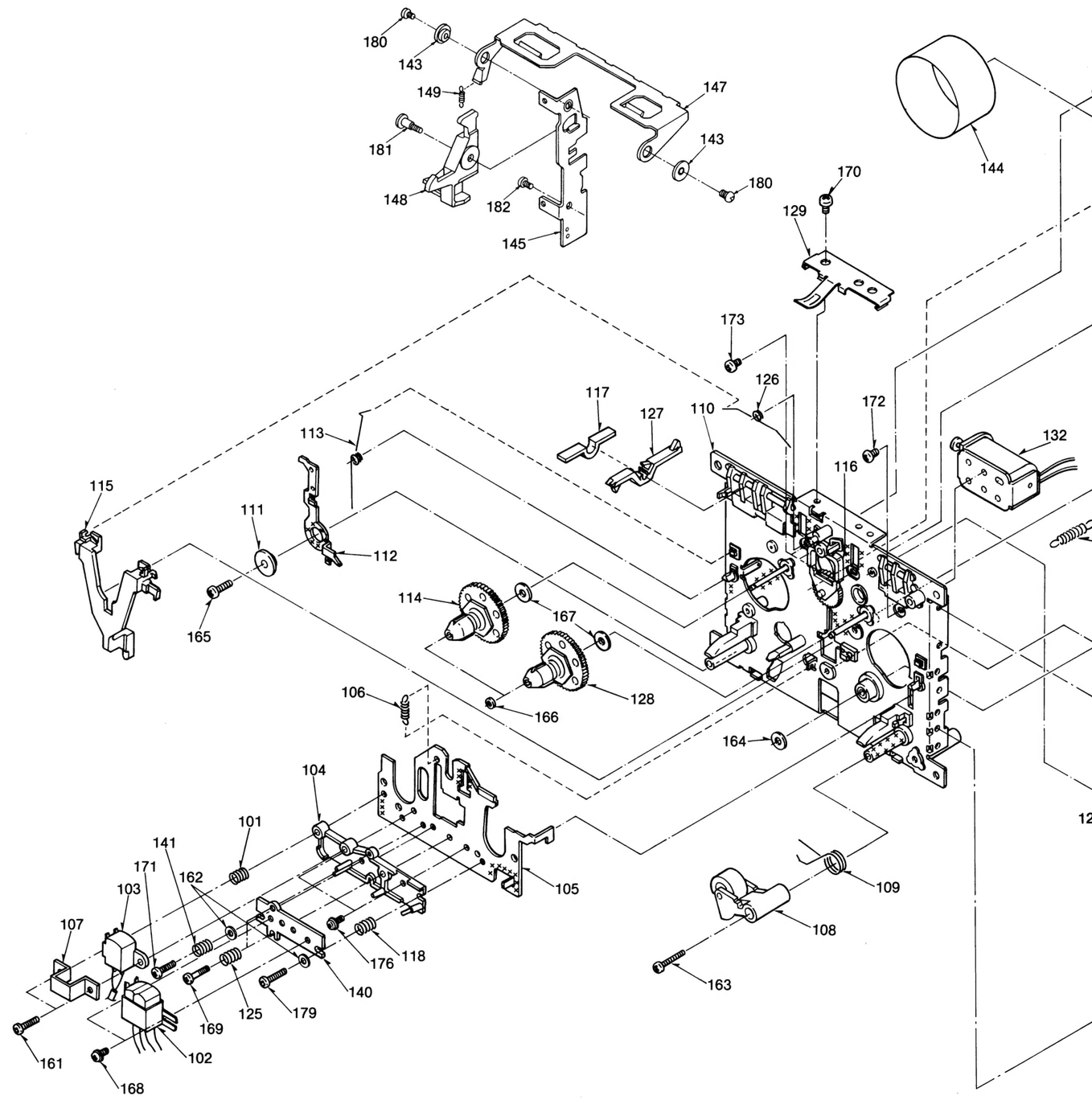
| | |
|---|---|
| Playback S/N ratio<br>∗Test tape...QZZCFM | Greater than 45dB |
| Overall distortion<br>∗Test tape<br>...QZZCRA for Normal<br>...QZZCRX for $CrO_2$<br>...QZZCRZ for Metal | Less than 4% |
| Overall S/N ratio<br>∗Test tape ...QZZCRA | Greater than 43dB<br>(without NAB filter) |

## ■ REPLACEMENT PARTS LIST

| Ref. No. | Part No. | Part Code | Description |
|---|---|---|---|
| CASSETTE DECK | | | |
| 101 | SMQA1001 | 016 726 0827 7 | SPRING |
| 102 | SJH104 | 001 270 1869 7 | MAGNETIC HEAD |
| 103 | SJH100 | 001 270 1699 7 | MAGNETIC HEAD |
| 104 | SMQA1162 | 016 643 1068 8 | HEAD SPACER |
| 105 | SMQA1163 | 016 630 1857 8 | HEAD BASE |
| 106 | SMQA1004 | 016 726 0826 8 | SPRING |
| 107 | SMQA1039 | 016 640 0465 8 | COVER |
| 108 | SMQA1005 | 016 740 0114 1 | ROLLER |
| 109 | SMQA1006 | 016 726 0825 9 | SPRING |
| 110 | SMQA1165 | 016 630 1858 7 | CHASSIS ASS'Y |
| 111 | SMQA1009 | 016 643 0966 7 | SPACER |
| 112 | SMQA1011 | 016 717 0254 3 | ARM |
| 113 | SMQA1012 | 016 726 0835 7 | SPRING |
| 114 | SMQA1013 | 016 913 0004 5 | REEL |
| 115 | SMQA1015 | 016 718 3350 7 | BRAKE LEVER |
| 116 | SMQA1061 | 016 742 0039 5 | IDLER PULLEY |
| 117 | SMQA1166 | 016 718 3407 7 | DET. LEVER |
| 118 | SMQA1170 | 016 726 1014 2 | AZIMUTH SPRING (R) |
| 119 | SMQA1021 | 016 643 0965 8 | SPACER |
| 120 | SMQA1041 | 001 035 0392 0 | PHOTO ELECTRIC TRANSDUCER |
| 121 | SMQA1022 | 016 643 0964 9 | SPACER |
| 122 | SJT30243-V | 003 410 6222 6 | CONNECTOR(2-P) |
| 123 | SJT30440LX-V | 003 410 6076 8 | CONNECTOR(4-P) |
| 124 | SJT30740LX-V | 003 410 5990 7 | CONNECTOR(7-P) |
| 125 | SMQA1172 | 016 726 1012 4 | SPRING |
| 126 | SMQA1024 | 016 726 0834 8 | SPRING |
| 127 | SMQA1025 | 016 718 3349 0 | DET. LEVER |
| 128 | SMQA1026 | 016 913 0003 6 | REEL |
| 129 | SMQA1062 | 016 726 0881 1 | SPRING |
| 130 | SMQA1171 | 016 717 0280 1 | PLAY ARM |
| 131 | SMQA1029 | 016 640 0459 6 | CAP |
| 132 | SMQA1070 | 003 454 0638 6 | PLUNGER |
| 133 | SMQA1173 | 016 756 0089 9 | WHEEL |
| 134 | SMQA1174 | 016 745 0260 7 | GEAR |
| 135 | SMQA1097 | 016 643 1004 4 | SPACER |
| 136 | SMQA1068 | 016 650 5303 9 | BRACKET |
| 137 | SMQA1036 | 002 310 2270 9 | DC MOTOR |
| 138 | SMQA1037 | 002 310 2271 8 | DC MOTOR |
| 139 | SMQA1038 | 016 752 0126 1 | FLAT BELT |
| 140 | SMQA1176 | 016 630 1859 6 | HEAD PLATE |
| 141 | SMQA1177 | 016 726 1013 3 | AZIMUTH SPRING (L) |
| 142 | SMQA1072 | 016 726 0883 9 | SPRING |
| 143 | SUXM5 | 016 634 0141 1 | SPACER |
| 144 | SMQA1179 | 016 601 0647 3 | SHILD PLATE |
| 145 | SMNM8A | 016 632 1914 6 | BRACKET |
| 146 | SMNM9 | 016 632 1855 0 | BRACKET |
| 147 | SMQA1042 | 016 718 3369 6 | LEVER |
| 148 | SMQM30015A | 016 718 3400 4 | LEVER, EJECT |
| 149 | QBT1936M | 016 726 0914 9 | SPRING |
| SCREWS,WASHERS & NUTS | | | |
| 161 | XSN2+8 | 005 500 1301 1 | SCREW |
| 162 | SMQA1161 | 016 643 1069 7 | WASHER |
| 163 | SMQA1164 | 016 713 0416 3 | SCREW |
| 164 | SMQA1007 | 016 862 1041 8 | WASHER |
| 165 | XTN3+10 | 005 501 4763 8 | SCREW |
| 166 | SMQA1010 | 016 765 0056 7 | WASHER |
| 167 | SMQA1014 | 016 641 0246 2 | WASHER |
| 168 | SMQA1167 | 016 713 0418 1 | SCREW |
| 169 | SMQA1168 | 016 713 0417 2 | SCREW |
| 170 | XTN3+4 | 005 501 4864 4 | SCREW |
| 171 | SMQA1169 | 016 713 0419 0 | SCREW |
| 172 | XYN26+C3 | 005 503 0738 5 | SCREW |
| 173 | XYN26+C6 | 005 503 0554 1 | SCREW |
| 174 | XTN26+8 | 005 501 3998 5 | SCREW |
| 175 | SMQA1031 | 005 513 4185 4 | WASHER |
| 176 | SMQA1175 | 016 713 0420 7 | SCREW |
| 177 | XTN3+5 | 005 501 4083 5 | SCREW |
| 178 | XTN2+6 | 005 501 3949 4 | SCREW |
| 179 | XSN2+8 | 005 500 1301 1 | SCREW |
| 180 | XTV3+6F | 005 501 0891 7 | SCREW |
| 181 | SMQA1017 | 005 500 6211 2 | SCREW |
| 182 | XTN3+5F | 005 501 3502 1 | SCREW |



## ■ MECHANICAL PARTS LOCATION



## ■ MECHANICAL PARTS LOCATION

| Description |
|---|
| MOTOR |
| MOTOR |
| T BELT |
| D PLATE |
| MUTH SPRING (L) |
| ING |
| CER |
| LD PLATE |
| CKET |
| CKET |
| ER |
| ER, EJECT |
| ING |
| EW |
| HER |
| EW |
| HER |
| EW |
| HER |
| HER |
| EW |
| EW |
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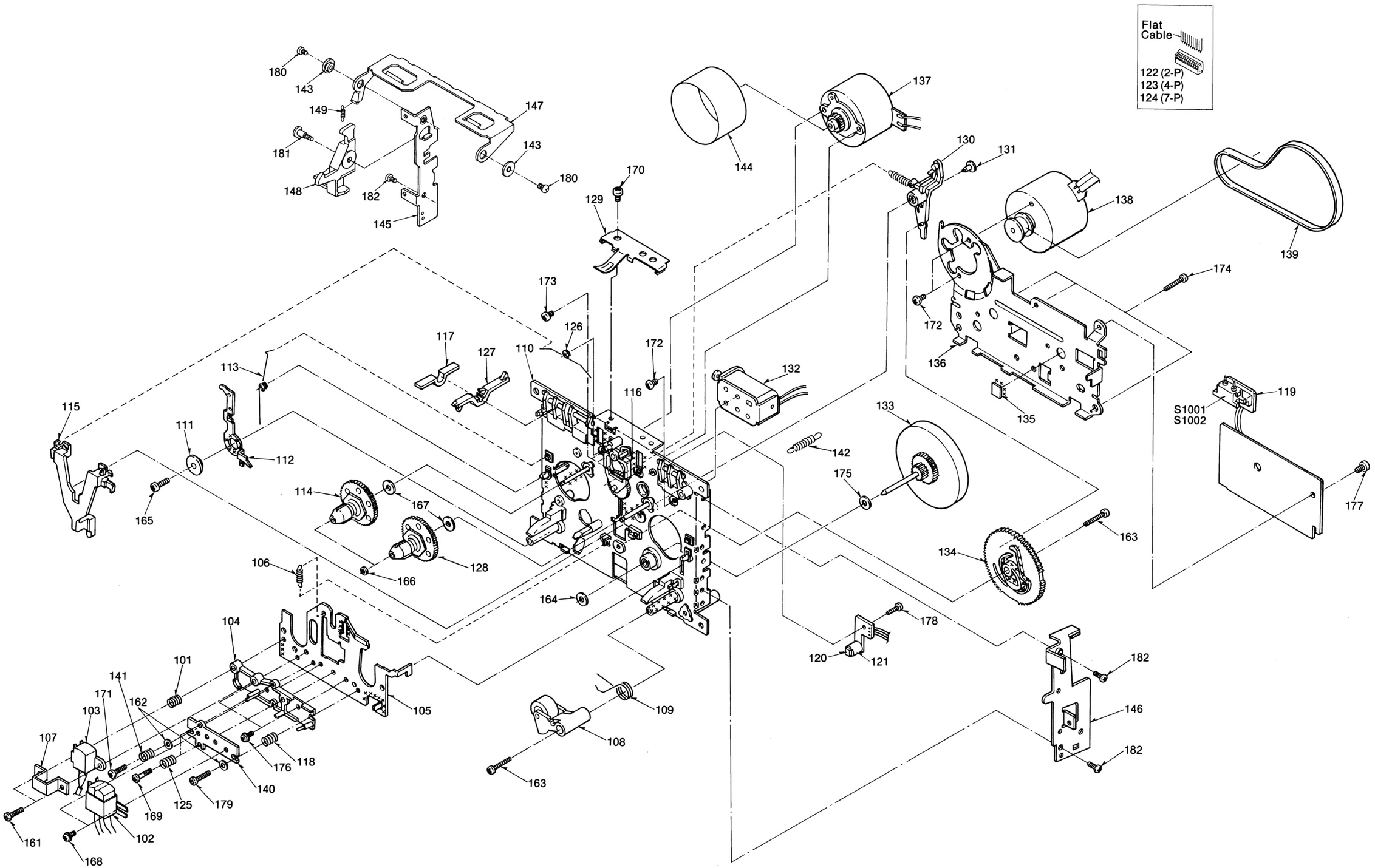
| EW |





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